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NOVEMBER, 1941

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D. M. CAMPBELL, *Editor*
7632 S. Crandon Ave., Chicago, Ill.
Telephone South Shore 7160

H. J. MOSTYN, *Eastern Representative*
1265 Broadway, New York, N. Y.
Telephone Murray Hill 4-4037

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VETERINARY MEDICINE

Registered in U. S. Patent Office

Leading Publication in the Veterinary Field for More Than Thirty Years

VOL. XXXVII **NOVEMBER, 1941** **No. 11**

The Field Museum of Natural History in Chicago has just received a collection of 5000 different bird specimens from Bolivia.

There are more than 1,000,000 people living in the United States today, who now have or will later develop diabetes, whose lives will be prolonged by the use of insulin. The discovery of insulin was made entirely through research on dogs.

Persons suffering from pernicious anemia, who have been relieved or cured through the discovery of the liver treatment by Dr. George R. Minot, owe their well-being indirectly to the late Frederick Banting, discoverer of insulin for use in diabetes. Doctor Minot, gravely ill with diabetes, was enabled, through the use of insulin, to continue his research which resulted in the production of the successful liver extract treatment for pernicious anemia.

Lack of pantothenic acid, the fifth member of the vitamin B complex, is held responsible for a strange new disease, reports Dr. G. C. Supplee, director of Borden Research laboratory. He has found that animals deprived of this acid suffer serious damage to the cortical layer of the adrenal glands, which in turn causes a discharge of blood, a wasting away and finally death of the tissue. Muscle tissues and abdominal cavities become dehydrated, causing fatigue and even death. Dr. Supplee is convinced that pantothenic acid causes impairment or cessation of cortical hormone secretions. Control of the water and the salt balance of the body is maintained by these secretions.

The Dassie (also known as hyrax and coney) is about the size of a rabbit but it is the closest living relative to the elephant.

Foxes and minks are now classified as domestic animals in Michigan. The bills creating this distinction were passed by the legislature quite recently and they were promptly signed by the governor. These laws protect the ranchers in the property rights in their animals, provide penalties for trespassing on ranch property, and make provision for the registration of tattoo marks.

Penicillin, a healing principle extracted from a mold, *Penicillum notatum* (closely related to cheese mold) has been described by Prof. H. B. Flory in the British *Lancet*. Penicillin is successful in many cases of streptococcic and staphylococcic infections where sulfa drugs fail. Although it does not kill the germs, their growth is stopped with a power "as great as or greater than that of the most powerful antiseptics known." Penicillin checks the germs, then the white corpuscles finish them.

Dr. Herald R. Cox, of the Rocky Mountain laboratory of the United States Public Health Service, has been presented the coveted Theobald Smith award. It was given to him by the American Association for the Advancement of Science during the 50th anniversity celebration of the University of Chicago late in September. Doctor Cox was chosen for this award in recognition of his having cultivated a vaccine for Rocky Mountain spotted fever and other rickettsial diseases, including typhus fever.

Those Garbage-Fed Hogs Again

In the June 28, 1941, issue of the *Journal of the American Medical Association* appeared an editorial discussing progress in the control of trichinosis, and calling attention to recent work purporting to show the value of rodent control in reducing the incidence of Trichinella infection among garbage-fed swine. The *Journal* commented: "Rodent control apparently is a statistically verifiable method of reducing trichinosis percentage in garbage-fed swine."

Taking issue with this statement, Dr. Bertram P. Brown, Director of Public Health of the State of California, wrote the *Journal* as follows:

"The California Department of Public Health, coöperating with the United States Public Health Service, has examined 261 garbage-fed swine from the same area [as that in which the investigation commented on by the *Journal* was conducted]. These examinations were conducted under the supervision of Dr. K. B. Kerr as part of the statewide survey of the trichinosis problem. Of these, 13.8% were found infected with Trichinella, an incidence comparable to that found by Hobmaier and Geiger previous to the institution of rodent control on these ranches. Our examinations were made during the past 16 months and after the rodent control program on these ranches had been in effect for at least two years. Futhermore, the examination of 71 Norway rats from four of these ranches has revealed only 11.8% infected with Trichinella—an incidence which is lower than that found in the hogs examined. Our evidence, therefore, does not support the thesis that rodent control is an effective method of reducing the incidence of infection with Trichinella in garbage-fed swine. . . ."

In spite of all ingenious attempts to shift the blame or to find a remedy short of sacrificing the profits inherent in the feeding of raw garbage to swine, the fact remains that we are going to have trichinosis in this country just as long as we have hogs fed on uncooked swill.

Those who are interested, like the *Journal of the A. M. A.*, in "statistically verifiable methods," are referred to the recently-issued report *Meat for Millions* (reviewed elsewhere in this issue). There they will find statistics showing the inevitable correlation between uncooked garbage and trichinosis—statistics enough to satisfy the most captious, and to give a major headache to the minority group solely interested in protecting the pocketbooks of the garbage-feeders.

Maurice C. Hall once said: "It appears to be a legitimate demand that when a man exchanges dollars for pork, he should not do it on the basis that he may be purchasing his death warrant, and that for a day when foods of all sorts are assumed to be, and quite generally are, safe and wholesome as produced and marketed, no one has a right to demand that an exception be made for pork in order that the custom of feeding raw pork scraps may be preserved."

* * * *

Many Animal Diseases Hazardous to Man

Strangely, man's nearest relatives among the lower animals are but a slight hazard to him because of communicable disease. About the only disease man is liable to acquire from monkeys and apes is yellow fever. Man's closest friend, the dog, likewise is, ordinarily, the carrier of only one disease—rabies. Rodents communicate to man some of his most serious diseases, but the number is not large—plague, tularemia, rat-bite fever, food poisoning, and spirochetal jaundice. The domestic hoofed animals are more hazardous to the health of man. From the cow he acquires anthrax, undulant fever, tuberculosis, foot-and-mouth-disease, scarlet fever, pox, streptococcus infection, and actinomycosis. In addition to some of these, swine contribute also trichinosis and swine erysipelas, and horses add glanders and equine encephalomyelitis.

* * * *

It is not within the power of the properly constructed human mind to be satisfied. Progress would cease if this were the case. The greatest joy in life is to accomplish. It is the getting, not the having. It is the giving, not the keeping. I am a firm believer in the theory that you can do or be anything that you wish in this world, within reason, if you are prepared to make the sacrifices, think and work hard enough and long enough.—*Frederick Grant Banting.*

FACULTY OF THE COLLEGE OF VETERINARY SCIENCE, UNIVERSITY OF THE PHILIPPINES

First Row (left to right): Dr. Lope M. Yutuc (Medicine); Dr. Vicente Ferriols (Jurisprudence); Dr. Manuel D. Sumulong (Anatomy and Animal Products); Dr. A. K. Gomez (Acting Dean, Pathology and Bacteriology); Dr. Gregorio San Agustin (Surgery; Director, B. A. I.); Prof. Carlos X. Burgos (Zootechnics); Dr. Juan Bunag (Meat Inspection).

Second Row: Dr. Jose A. Solis (Anatomy); Dr. Amado E. Baladad (Zootechnics); Dr. Deogracias J. Cabrera (Parasitology and Protozoology); Dr. Faustino S. Mensalvas (Surgery); Dr. Tomas T. David (Anatomy); Dr. Jose B. Uichanco (Pathology and Bacteriology); Dr. Arcadio C. Gonzaga (Physiology and Pharmacology); Dr. Vicente Diaz (Anatomy).

Dr. Zacarias de Jesus (Parasitology and Protozoology) was not present when the picture was taken.

IN enumerating the veterinary colleges of the United States, one of them, the University of the Philippines, College of Veterinary Science, is frequently overlooked. This should not occur for the institution is an important one that has reflected credit on the veterinary profession of the Far East.

This college, although one of the smaller units of the university, ranks high in its contributions to the national welfare and is playing an increasingly important role in Philippine agriculture. The college was established 31 years ago to meet an exigency which threatened to paralyze Philippine agriculture—the great rinderpest epidemic of 1901-1902, which destroyed over 600,000 carabaos and cattle and paralyzed agriculture in many sections of the country. So widespread was the epizootic that there were not enough veterinarians in the country nor could enough be imported to attend to all the rinderpest outbreaks. Realizing the havoc of the disease and its disastrous effects upon the economic life of the country, and the difficulty of bringing over foreign veterinarians because of their unfamiliarity with local conditions, Dr. Archibald Ward, then chief veterinarian of the Bureau of Agriculture, initiated a movement for the establishment of a veterinary college in the Philippines. In 1908 the Philippine Legislature, in founding the University of the Philippines, specifically provided for the establishment of the College of Veterinary Science as a unit of the university. The college was duly established and opened its doors on June 14, 1910. The initial enrollment was 10. Doctor Ward became the first dean.

The college has from the very first adhered to high academic standards and it has graduated a small but able corps of veterinarians who have distinguished themselves in government service and private practice.

The curriculum of the college was originally a four-year course. It was increased to five years in 1912 and reduced to four

years again in 1924. In June, 1938, a five-year curriculum was approved and now obtains.

Enrollment has never been high, due largely to the apathy of a public still ignorant of the place of veterinary science in the development of the country. However, in 1911, the government, recognizing the importance of trained veterinarians, created 25 scholarships (later reduced to 20), each worth 35 pesos (later reduced to 25 pesos) a month. A good number of provincial and municipal scholarships have been created also to encourage young Filipinos to enroll in the college. There are now 85 students, of whom six are Siamese, two Chinese and one an American.

The college has had five deans in the 31 years since it was established. As already mentioned, Dr. A. R. Ward was the first dean and served two years. He was succeeded by Dr. Wm. A. Boynton, who occupied the position till 1919. Then for two years the Dean of Agriculture in the university held the position of acting dean of the veterinary college. Dr. A. L. Shealy was elected dean in 1921 and resigned in 1924; thereupon Dr. San Agustin, who had been on the faculty since 1916, was promoted to the office of dean. In 1939, Dr. Angel K. Gomez was appointed acting dean and is serving in that capacity at the present time. Originally the faculty was composed wholly of American veterinarians, but gradually as new appointments were made, Filipinos were chosen, until now all are Filipinos. Dr. Victor Buencamino, graduate of the New York State Veterinary College, became the first Filipino member of the faculty.

* * * *

The amount of petrol (motor fuel) allowed to the practicing veterinarian in England has been curtailed considerably, even though his practice has been increased by the introduction of new schemes for the control of diseases of animals, and by reason of the enhanced value of the individual animal. The veterinarian is expected to organize his daily round so as to reduce his travel. His clients are urged to get in their calls as early in the day as is possible.

Cornell Establishes a School of Nutrition

Cornell University is to have a school of nutrition, believed to be the first of its kind anywhere. Dr. Leonard A. Maynard, who has been Professor of Animal Nutrition at Cornell for many years, is to be director. Students who have completed three years of college, largely along nutritional lines, may enroll for the two-year course in nutrition. On completion they will receive a degree of Master of Science in Nutrition. Agricultural students, those preparing for institutional work, and others who may be training for service in the food industry, are eligible to pursue these courses.

Veterinarians, physiologists and others interested in animal sciences, are to be given courses in the School of Nutrition.

* * * *

Army Protects Soldiers in Tropics Against Yellow Fever

Inoculation of the entire command at Puerto Rico against yellow fever has been completed, according to the War Department announcement. It was the largest mass yellow fever inoculation ever attempted in the history of the U. S. Army.

Decision to adopt this method of protecting troops in tropical regions against yellow fever grew out of the discovery by medical science of a jungle type of the fever that has its reservoir of virus in wild life, as contrasted with malaria, which is transmitted only between human beings. On account of this wild life reservoir for yellow fever virus it cannot be stamped out, so immunization was adopted in order to protect soldiers against possible infection in tropical areas.

All military personnel in tropical regions of the Western Hemisphere are being inoculated against yellow fever.

The yellow fever vaccine used is a special strain that has been attenuated through prolonged cultivation in tissue cultures by the Rockefeller Institute of Medical Research. Great care is necessary in shipping this vaccine, as the temperature must never exceed 39.2°F.

The 30th Veterinary General Hospital on Army Maneuvers

THE scene on the front cover (of which the illustration at the right is a reproduction) shows horses being watered at the 30th Veterinary General Hospital at its camp on the Calcasieu River in southern Louisiana near Lake Charles.

This organization, as the principal veterinary installation of the Third Army, took part in the Army maneuvers in Louisiana and East Texas, in which approximately 500,000 troops were engaged. In a period of 45 days more than 1,800 animal casualties were received, treated, and evacuated back to their organizations or, during the final two weeks, to the home stations of the organizations to which they belonged, chiefly in Texas.

Picket lines at the Calcasieu camp

Horses being watered at the 30th Veterinary General Hospital at its camp on the Calcasieu River. Water was pumped from the river (by a gasoline motor) into canvas watering troughs to which the horses were led from the picket line four times daily. In this camp the number of animals averaged 300 and required the pumping of approximately 3000 gallons of water per day

The camp on the Calcasieu was approximately 80 miles behind the "front line" of the cavalry. The hospital was located there from August 30th to September 14th, having made a hurried withdrawal from De Quincy, 25 miles north, when the cavalry suffered a reverse. The withdrawal was made by leading overland all patients able to walk and transporting the hospital's impedimenta, some 50,000 pounds of it, in the organization transportation. The only assistance received was transportation of some 170 horses unfit to walk the distance.

The camp was for the most part in deep woods, largely water oaks festooned with Spanish moss, and was very wet and unsatisfactory because of the almost daily rains.

Left to right: the Medical Dispensary and ambulance; a corner of the Junior Officer's tent, the Executive Officer's tent, and the Commanding Officer's tent. The picket lines were in the rear of these tents

New horse barns erected on the serum farm of the Fort Dodge Laboratories, Inc., near Fort Dodge, Iowa. Each barn is 40x150 feet in dimensions and has a loft with a capacity of 150 tons of hay. These barns have a mechanical ventilating system that is automatically controlled, individual mangers, automatic waterers and creosoted wood blocks for stall floors. Each barn houses 50 horses and contains additional box stalls and grain rooms. The one-story brick building between and in front of the barns (also new) is a laboratory where serum is drawn from hyperimmune horses and cattle (cattle barn not shown in the illustration). This laboratory measures 20x80 feet and is equipped with the most up-to-date facilities. Between the barns and back of them are exercise lots, several acres in extent

A total of 5,000,000 acres of pasture lands is used by the live stock growers for grazing cattle, hogs and sheep.

* * * *

"The farmer is now one of the most important key men in the war machine," says the Secretary of the British Ministry of Agriculture and proceeds to sponsor demonstrations in various parts of England on the preparation of silage, which is a comparatively new undertaking in that country. Maize (corn) is recommended for silage.

Another recommendation made by the Ministry is that farmers treat all straw—wheat, barley or oat—with caustic soda, which turns the straw into a starchy food, much like a concentrate, that can be used to replace sugar beet pulp and roots. A leaflet explains the method to be used and describes the building and installing of a straw pulp plant.

In the interests of economy all railway companies grant farmers the privilege of harvesting grass on railway slopes adjoining their farms.

The Michigan Agricultural Experiment Station has found that the carotene (provitamin A) content of Sudan grass is greater in the young grass. A definite progressive decrease occurs as the plants mature. One gram of dried short grass contains 3,621 micrograms of carotene as compared to 57.6 micrograms in the same amount of dried mature (50 inches tall) Sudan grass.

* * * *

The Agricultural Experiment Station of the University of Wisconsin has made tests, both through feeding and chemically, which show that when frosted, Sudan grass and sorghum are not poisonous, the prussic (hydrocyanic) acid content being far below the 75mg per 100gm of dry matter which is considered the lowest level dangerous to cattle. These tests were made on grass recently frosted. Poisoning occurring after frost doubtless is due to new growth which often happens when frost has been followed by warm weather. Sudan grass less than 12 inches tall contains a much larger amount of prussic acid than when it is more mature.

Balanced Dog Foods

The dog owners of today have one vast advantage over those of even a decade ago. It is this; in the fierce competition existing among makers of dog foods, only the best products can long hold public patronage, and by *best* we mean those foods whose ingredients are the result of painstaking scientific study, and are carefully blended and balanced to supply correct and complete canine nutrition, especially toward the elimination of deficiency diseases such as rickets, black tongue, and running fits. —*Hunting and Fishing.*

Switzerland's Answer to the Rabies Problem

In 1900 the first antirabies center in Switzerland was established in Berne at the Institute for the Study of Infectious Diseases. Up to that time all rabies cases were sent for treatment to the Pasteur Institute in Paris. The center is in charge of the head of the university department of hygiene and bacteriology, and the university also provides clinic hospitalization.

Scientific research, prophylactic inoculation and diagnosis, and vaccination of persons and animals bitten by rabid animals are the functions of this antirabies center.

Although in Switzerland vaccination is not required by law, rabies has decreased rapidly because of the efficacy of the vaccination and the prophylactic and veterinary police measures practiced. During the decade before the center was established there were six deaths from rabies; subsequently the death rate declined steadily until 1930, since when there have been no deaths from this disease.

In 40 years the center has treated 394 persons (of whom 355 had been bitten by rabid dogs), and many animals. A large percentage of the rabid animals were killed soon after the victims were bitten, which hindered a thorough analysis of many of the cases.

Eighteen daily injections are the usual requirement, but in more serious cases 21 are given. The vaccine used is a modification of that made famous by Pasteur.

How Large Is a Large Litter?

Fecundity in dogs is an endless topic of conversation. Continually, the lay press prints articles regarding large litters, and equally often the American Kennel Club has to decide if an unusually large number of puppies constitutes a record. In olden days, it was practically impossible to decide such a question, but in 1932 the American governing body began to register litters, and now it is simple enough to decide what is and what is not a record in so far as pure-bred dogs are concerned.

According to the records of the AKC, the largest litter ever reported was one of English springer spaniels. There were 18 in that litter, but nine were either born dead or died immediately. This left the record to a litter of Irish setters, with 17 puppies registered. Then come three different breeds, each registering a litter of 16; they are English springer spaniels. Great Danes, and Newfoundlands. These are followed by collies and St. Bernards, each having a registered litter of 15.

The largest of these litters are small when compared with those that have been mentioned by some dog fanciers. In a recent letter to *The Field* Mrs. Mallett, of Nair Nairobi, told of a bull terrier that gave birth to 22 puppies at one time. The largest litter of which I have heard was the 23 of a St. Bernard. In my own kennel stud books, I have a note of three litters of bloodhounds that were sired by Ch. Panther for another breeder, which consisted of 15, 16, and 17, respectively.—*Melville P. Cummin,* in *Amer. Ken. Gaz.*

A Ripley "Believe It or Not" cartoon of recent date contained a record of an Irish setter at Arkansas City, Kansas, that gave birth to a litter of 20 pups. Evidently Mr. Ripley had not heard of the prolific St. Bernard which whelped 23 puppies, or of the blue fox female on a fur farm at Ritchey, Montana, which came close to this canine record, having produced a litter of 20 pups. An Oregon mink is in the running with a litter of 15 kits.

In Ontario a *ten-year-old* cocker spaniel recently gave birth to ten puppies. Dam and puppies are reported to be doing well.

Small Amounts of Minerals Recommended for Pigs

Three years of trials with different levels of minerals in pig rations now enable G. Bohstedt, J. M. Fargo, W. A. King and O. B. Ross to make definite recommendations for mineral supplements to feed with rations composed mainly of corn and soybean oilmeal.

The outstanding discovery in this work is that it is a mistake to follow the old practice of feeding from 2 to 3% minerals, if the pigs are out in direct sunlight a good share of the time. Pigs gain faster, and on less feed, if they get smaller amounts of minerals.

On the other hand it is also a mistake to feed no minerals at all in soybean oilmeal rations. Only when there is plenty of skimmilk or tankage in the ration do pigs get along well without extra minerals.

The best rate to feed high-calcium limestone (the kind bought in feed stores, and containing about 38% calcium) is from 0.50 to 0.75% of the ration.

If the limestone is of the Wisconsin dolomitic type commonly used for liming land, containing about 22% calcium, the best level is 1%.

With a mixture of high-calcium limestone and steamed bonemeal, the desirable rate is about 1% of the ration. The best way to mix these minerals seems to be with two parts of limestone to one of bonemeal, although equal parts also proved a good combination.

It is entirely practical to self-feed minerals instead of mixing them in the feed. Pigs made excellent gains when they helped themselves to limestone and bonemeal kept in separate mineral boxes, or to limestone alone.

All these mineral-feeding plans work very well. There is little to choose between them, consequently a hog raiser can select whichever one he prefers with reasonable assurance that it will be satisfactory. What little advantage there is seems to rest with a two-to-one mixture of limestone and bonemeal used as 1% of the ration.

The important point is that each of these mineral-feeding plans, where used with a ration of ground corn, soybean oilmeal, alfalfa meal and iodized salt, brought about good gains of about 1.3 lbs. daily, and made it possible to produce 100 lbs. of pork on about 400 lbs. of feed.—*Bul. 451 Agr. Exp. Sta. Univ. of Wisc.*

* * * *

Vitamin A for Horses

In studying the vitamin A and carotene requirements of horses, and the symptoms which are caused by a deficiency of the vitamin, investigators at the California Agricultural Experiment Station found that a ration of rolled barley, rolled oats, wheat bran and linseed oil, or this combination of feeds fed with beet pulp or straw, failed to provide the required amounts of vitamin A for the horses in the test. Even though they had previously accumulated large reserves of vitamin A in their body tissues, the horses on these rations still acquired night blindness within 284 to 627 days and several eventually died from the effects of the deficiency. It was determined that horses must be furnished with about 1,000 International Units of vitamin A, or 1.2 milligrams of carotene, for each 100 pounds of body weight.

* * * *

Salt Is Preventive of Gland Deterioration

Ordinary table salt has been found to be an effective preventive of deterioration of the pituitary, one of the most important of the body's ductless glands, in experiments performed at the University of California by Dr. Alexei Koneff, R. O. Holmes and Dr. J. D. Reese.

Ordinarily, the pituitary undergoes deterioration if the adrenal glands become diseased or are surgically removed. The consequences may be exceedingly serious, for the pituitary influences growth, blood pressure, the normal functioning of the sex glands and of so many other organs that it is sometimes referred to as the "master gland."

The three researchers reported that rats whose adrenals had been removed survived indefinitely in apparently good health and with normal glandular functions if they were given plenty of salt.—*S. N. L.*

A Locomotor Disorder in Pigs

A troublesome locomotor disorder among pigs, manifested by incoordination in the use of the legs, abnormal posture, and lameness, has been a common occurrence in the swine herd of the Bureau of Animal Industry at Beltsville Research Center, Beltsville, Md. The disease frequently occurs among pigs confined in small pens with concrete floors.

Myelin degeneration of the nerves and spinal cord was demonstrated in the affected animals. The extent of degeneration was in general parallel with the severity of incoordination.

It was evident that the disorder was not due to deficiency of vitamins A or D, the lack of which sometimes causes characteristic types of lameness and paralysis. Experiments were therefore made to determine the effects of mineral elements in the diet, and to find easily available feeds for use as supplements or replacements in the stock diet which would prevent or cure the disease.

These experiments were carried out on pigs from the spring farrow of 1937 through the spring farrow of 1939. The pigs were generally placed on experiment at 10 to 12 weeks of age and were kept on test for 12 to 24 weeks.

The experimental diets used were prepared from the general supply of feeds purchased for use in swine feeding at Beltsville. The stock diet consisted of No. 2 yellow corn, digester tankage of 60% protein content, linseed meal, alfalfa-leaf meal made from sun-cured hay, and a mineral mixture. Various supplements or replacement feeds were used, being chosen because of known or supposed mineral, vitamin, or protein value or as contrasting feeds for those replaced in the stock diet.

When the normal diets were heated at 115° to 120° C. for 30 to 40 hours, incoordination and myelin degeneration were generally produced in all animals. Heating greatly increased the incidence and severity of the disease. The incidence of the disease was high on stock diets commonly used for growing and fattening hogs.

Supplemental or replacement feeds incorporated into the basic diets, including the heated diets, gave favorable results in some cases, although complete protection was infrequent. Of the various feed materials investigated, liver, concentrated milk products, barley, and oats afforded the greatest protection.

Animals that did not receive a mineral supplement in the diet tended to show a greater degree of lameness than those receiving such a supplement.

The results indicate a deficiency disease of nutritional origin. The dietary factor or factors involved appeared to be present in variable or insufficient quantities in many of the feeds commonly used in hog feeding and to be destroyed or inactivated by dry-heat treatment.

* * * *

Labored Breathing in a Colt

I should like a prognosis and some advice regarding a three-year-old draft colt I have seen recently.

He has shown difficulty in breathing for at least four months, and does not now breathe through his left nostril. Naturally, breathing is labored and, during exercise, aeration is insufficient. No apparent cause could be detected by observation, palpation, or auscultation. Close examination of the left nasal passage was impossible with the restraint available. I gave a guarded prognosis, and suggested a later examination under complete anesthesia.

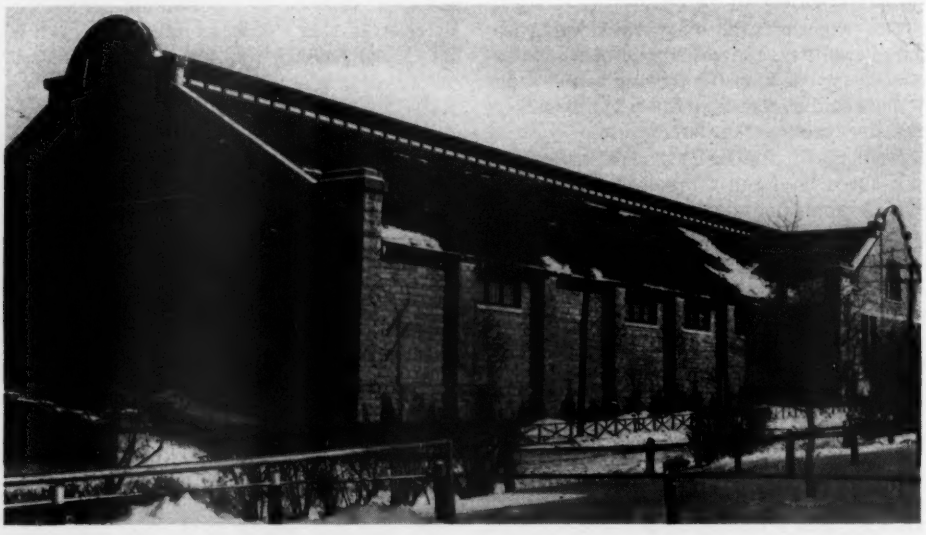
Is it true that in the majority of such cases the obstruction is large and difficult of removal, and the results of doubtful economic value?—*O. H. S.*

Comment: My experience with these cases in young horses indicates the wisdom of watchful waiting, and giving plenty of potassium iodide. Often, there is a growth of lymphoid tissue which seems to atrophy in time. Once in a while an atheroma, rather high up in the nasal cavity, is responsible; this can be incised. One saves a lot of grief by handling such cases with care, and not trying to do too much.—*E. T. B.*

Cavalry Training Includes Hunts

All members of the Ft. Riley Cavalry Club are also members of the local hunt club, which stages a hunt each Sunday morning. This is usually a drag hunt, which means that a bag odorized with anise or fox or coyote urine is dragged at the end of a rope by a horseman far enough ahead of the hunt so as not to be seen by its members. The trail thus made is easily found and followed by the hounds. Since they have no difficulty in following the trail, as would be the case if they were following a real fox, they travel fast. It is necessary, therefore, at intervals of 20 to 30 minutes, to stop a few moments and let the horses rest. This rest is the check shown in the illustration. A few times each year the club indulges in a live coyote hunt.

The Hunt is headed up by the MFH who, together with the Whippers In, constitute the officials of the Hunt. All other members constitute the Field. The usual Sunday morning hunt draws about 30 to 40 members. A mid-week hunt used to be held, but re-



Above: Fort Riley Hunt Scene at a Check. Below: West Riding Hall, Army Cavalry School, Fort Riley Kans.

cently everybody has been too busy to get out.

The pack consists of about 23 couples of good hounds. They are large and rugged and are one of the old packs in the country. Blood of the pack that returned from Germany with General Allen is incorporated in it. The hounds are housed in a kennel on the post, which though not elaborate is quite adequate.

PACKERS' CAMP HORSE PASTURE (CORRAL), FORT RILEY, KANSAS

There are several such "pastures" at Ft. Riley; some of them are used for the cavalry school horses, others for horses of the cavalry brigade which is located there. These animals are fed hay and grain while at "pasture" and are inspected in detail each week, particularly with a view to maintaining properly trimmed and balanced feet. Surplus horses and horses not used regularly are kept in such pastures which are really large lots. There is no grazing in them. About 300 horses were in the pasture shown in the illustration

■ At the bottom of page 546 is shown a view of the West Riding Hall of the cavalry school at Ft. Riley. There is also an East Riding Hall at this post. The one pictured is the newer and larger of the two and is equipped for holding horse shows, having seats across one end for spectators. It is partially heated in the winter.

This riding hall is one of the largest in the country. It is somewhat larger than the Madison Square Garden ring, but, of course, has much less seating capacity, accommodating only about 450 spectators.

These riding halls are among the busiest places on the Post, being continuously in use by classes of the cavalry school from seven o'clock in the morning until five in the evening, except for Saturday afternoons and Sundays, when they are used by individuals training their own horses or by polo teams. Both officer classes and non-commissioned officer classes are schooled in riding in these halls. Generally the classes are limited to from 30 to 35 students. Nearly all the initial instruction in equitation is given in the West Riding Hall.

Cavalry's Value in Syrian Campaign

A correspondent with the Australian forces in Syria near Sidon sent this dispatch to the London *Daily Telegraph:* "While Australian infantry and mechanized cavalry are hammering at the gates of Sidon, a force of horsed cavalry from a famous English Yeomanry regiment is pushing its way across the rough, hilly country which bounds the narrow coastal plain. The job they are doing vindicates the retention of some horsed cavalry, because they are operating across country which is absolutely impassable to armored fighting vehicles, and they are pushing ahead much faster than infantry could hope to do.

"These cavalrymen are delighted to have a real job to do at last. They had spent months of dull though necessary garrison duty in Palestine, and now have a role after a cavalryman's heart. They have even had the satisfaction of staging an old-fashioned charge with sabres. A squadron surprised a force of French entrenched on the outskirts of a village and rode through them twice, routing them completely.

"I watched the British horsemen moving up across the plain with the jingle of bits and accoutrements, and the clink of sabres against stirrup-irons, and it was a sight to stir the pulses. It was like a breath from the old days, when war was a less cold-blooded and mathematical affair than today—a last touch of romance in an unromantic and unpleasant business."

Blood Transfusion—Then and Now

It was the injection of medicine intravenously by Dr. (later Sir) Christopher Wren in 1656 that led to experiments in blood transfusion. Dr. Wren used a quill for this operation. The first authentic description of a successful transfusion was that of Dr. Richard Lower, performed in 1665, by which he transferred blood from the carotid artery of one dog into the jugular vein of another. This was done by means of a series of quills.

But credit for the first transfusion of blood into a human belongs to Jean Denys,, a physician to Louis XIV. Dr. Denys' experiments in transfusion were duly recorded in the diary of Samuel Pepys. However, it was not until 1667 that he finally succeeded in transfusing some lambs' blood into a boy who had had repeated bleedings in an effort to cure an obscure fever. The complete recovery of the lad was so encouraging that transfusion became a fad. It was given as a means of youth restoration to the aged, to those suffering from tuberculosis, uremic poisoning, syphilis and insanity. It was even used in an effort to settle domestic discord by reciprocal transfusions. There was much speculation as to whether dogs transfused with sheep's blood would grow wool, hoof and horn. Lambs were used most frequently as donors until the discovery was made, about the middle of the 19th century, that when the blood serum of two species were combined agglutination took place and the corpuscles of one species were dissolved. This summarily put a stop to the use of animal blood for such transfusions, and reliance was then placed entirely upon the use of human blood. It was soon found, however, that even human blood did not always react favorably, and transfusion gained the reputation of being a hazardous last resort. Little headway in solving the problems of transfusion was made until early in the 20th century, although it was realized that there was much more to be learned.

Since its first inception, the Science of Medicine has interested itself in the control of liquids in the body. But for many centuries this interest was typified by purging, emesis and bloodletting. Mythology contains the first recognized reference to transfusion. This is where Ulysses is described by Homer as a blood donor.

One of the chief obstacles in the use of blood lay in the fact that it clotted so quickly after being taken from the donor, making necessary immediate infusion into the donee. Defibrinated blood was used for a time with moderate success. It was during the world war that the simple method was evolved of adding to the blood as an anticoagulant enough sodium citrate to make a concentration of 0.25%. This discovery made possible the establishment of "blood banks" in which blood taken from the donor is kept at a proper temperature to prevent deterioration and be suitable for use at some future time. This proved a great advance in blood therapy, but it was still far from satisfactory in all cases, as many unexplained reactions and deaths continued to occur.

In 1900 it was found that a combination of blood from two individuals in many instances acted much the same as that of animal blood with human blood, i.e., agglutination with dissolution of corpuscles took place. Within a few years a technic was devised for finding if one kind of blood was compatible with another so it could be safely used. In 1930 the Nobel prize in medicine was bestowed upon Dr. Karl Landsteiner of the Rockefeller Institute for Medical Research in acknowledgment of his demonstration that there are a certain number of types of blood, and that a successful transfusion demands that the recipient receive his own identical type. The individual type of blood always remains the same regardless of age or disease. At present four major groups (types) and 72 subgroups are recognized.

This discovery gave a tremendous impetus

to the use of blood transfusions, which for many years had been used in a desultory manner because of the untoward reactions. Study and experiments have developed a safe product and convenient, sanitary methods of administration, so that today blood transfusion is a fully accepted and universally used procedure in shock, anemia and other cases where such stimulant is required. In fact, it has now become so relatively common that we are inclined to accept it without giving thought to the scientists who, over a period of almost three centuries, developed the procedures which remove all hazard from the operation. During this time animal experimentation has been largely responsible for the advance in our knowledge of blood transfusion.

Blood banks are now standard equipment in most modern hospitals, and each type of blood is instantly available. For some time efforts have been made to desiccate the blood plasma in order to facilitate storage and transportation. Within recent months two new methods have been announced for drying the millions of quarts of blood plasma which, it is estimated, will be needed for war injured. One of these, a simple, inexpensive procedure, has been devised by Drs. Samuel B. Harper and A. E. Osterberg of the Mayo Clinic. In addition to the part-time services of a technician, a $25 investment for equipment is all that is necessary to set up a small desiccating plant. This method can be used to produce instantly soluble dried blood plasma. The process consists merely of distilling the plasma in vacuo at a temperature slightly above that of the normal human body. It is easily applicable for use in the veterinary hospital for the production of dried equine plasma. For large scale production the equipment is necessarily much more elaborate.

That the use of dried plasma may be facilitated, a new portable emergency kit has just been developed. This small, compact kit contains the residue of 250cc of pooled liquid plasma, together with enough pyrogen-free sterile water and the apparatus for mixing and injecting. When the plasma residue is combined with the sterile water it makes 250cc of wet plasma, or the equivalent of 500cc of whole blood. The kit is so constructed that the product is easy to administer under the most trying conditions, even by those not expertly trained in intravenous technic. The apparatus can be set up in the field, where it is expected to fill an urgent need for an immediate plasma transfusion in much more advanced positions in warfare than has been possible heretofore—a powerful therapeutic weapon for the medical service. This portable kit should be equally useful, through the substitution of equine plasma, in the treatment of shock and other injuries to animals, with the resulting conservation of animal life both on the battlefield and elsewhere.

It now remains for scientists to devise a means for treating or otherwise modifying animal blood or plasma so as to make it available for human use.

Transfusion in Veterinary Practice

Veterinary medicine has kept in step with developments in blood transfusion. It has been adapted for use in both large and small animals for quite a number of ailments. Veterinarians, with available refrigerating facilities, can establish and continually maintain their own blood or plasma banks. It is advantageous to have, always at hand, sufficient whole blood or plasma for the treatment of calf scours, navel ill in foals, canine distemper, hemorrhage, purpura hemorrhagica and some anemias. Convalescent blood is perhaps the more desirable.

Transfusions should be more readily usable in veterinary medicine than in human practice as typing is unnecessary because undesirable reactions are relatively uncommon, and as a rule donors are much more abundant. As much as 400cc of blood may be taken from a large dog,—as up to 10cc of blood per pound of body weight is the amount usually taken from the donor. Of course the blood is mixed with an anticoagulant. In the treatment of hemorrhage it is the fluid and protein content of the blood, principally the albumen fraction, which raises and maintains the colloidal pressure within the vascular tree; therefore plasma can be successfully used in such cases. To obtain this plasma whole blood is refrigerated and when the corpuscles settle the liquid (plasma) can be drawn off and bottled for future use.

Dean of American Veterinarians in the Tropics Dies

As mentioned briefly last month, Dr. Guy A. Roberts, Ciudad Trujillo, D. R., died suddenly of cerebral hemorrhage August 24th, shortly after his arrival at Puerta Plata, D. R., on his return trip from the A. V. M. A. meeting in Indianapolis.

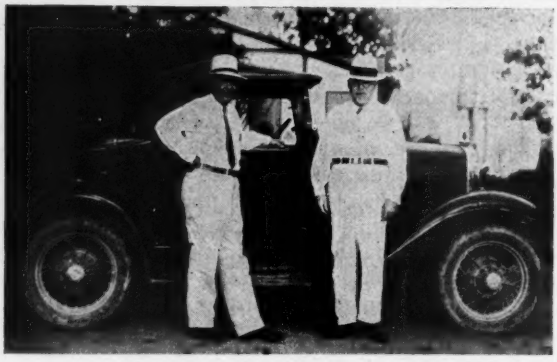
Guy Alexander Roberts was born December 11, 1875, at Parkville, Mo. He attended the University of Missouri and, after leaving school for a brief period to serve with Company I of the 5th Missouri Regiment of Volunteers in the Spanish-American War, he was graduated from that institution in 1899. He studied human medicine for two years, but decided to specialize in veterinary medicine, and attended the Kansas City Veterinary College, receiving the D. V. M. degree in 1903.

From 1903 to 1919 Doctor Roberts taught veterinary medicine at North Carolina State College. During these years he engaged in extension work in connection with the North Carolina Experiment Station, and helped organize farmers' institutes throughout the state.

In 1919 he went to Sao Paulo, Brazil, where he stayed for three years, helping to organize a school of veterinary medicine there. He then engaged in teaching and extension work in Brazil until 1928, when he accepted an appointment as veterinarian and animal husbandman at the agricultural experiment station in St. Croix, Virgin Islands, remaining there seven years.

Doctor Roberts in 1936 accepted the position of Director of Animal Health in the Dominican Republic, which he held at the time of his death. This is a position analogous to that of the Chief of the Bureau of Animal Industry in the United States, and carries with it much responsibility, which he fulfilled in a manner to excite the admiration and respect of all with whom his duties brought him in contact.

Through his long experience in the tropics, Doctor Roberts came to be recognized as an authority on tropical diseases of animals, and made many valuable contributions on this subject to veterinary periodicals.



G. A. ROBERTS AND A. T. KINSLEY IN 1932

Doctor Roberts (left) was graduated from the Kansas City Veterinary College a year before Doctor Kinsley. After graduation their paths separated widely, converging briefly in 1932 when they investigated together an epizootic among horses in the Virgin Islands and Puerto Rico. This photograph was taken at that time

Kinsley Retires from Editorial Post

After editing the *K. C. V. C. Alumni Quarterly* for more than 20 years, Dr. A. T. Kinsley, Kansas City, Mo., has retired from active participation in publishing the bulletin. The work will be carried on by Dr. C. D. Folse, Kansas City, Kans.

It has been in no small part due to the efforts of Doctor Kinsley that the Kansas City Veterinary College, which graduated its first class in 1892 and its last in 1918, can boast such an active and loyal alumni group. Doctor Kinsley began teaching in the college immediately following his graduation in 1904, and served as its president from 1913 to 1918, so that his association with its graduates has been a close one. The high regard in which he is held by K. C. V. C. alumni was demonstrated when, at their banquet at the Memphis meeting of the A. V. M. A. in 1939, they presented him with a life-size oil painting of himself.

Doctor Folse was graduated from the college in 1910, and was Registrar of the college and a member of its faculty until its close in 1918.

Infectious Bronchitis*

Confusion still exists in the terminology of respiratory diseases. This is particularly true with infectious bronchitis, as many persons are still calling it coryza. Coryza is a bacterial disease, whereas bronchitis is caused by a virus. The viruses of bronchitis and infectious laryngotracheitis are separate and distinct. Our records suggest that coryza is rare, and that laryngotracheitis occurs occasionally, whereas the cases of bronchitis outnumber those of laryngotracheitis about five to one.

Bronchitis of chicks and of adults is apparently caused by the same virus. Mortality in chicks affected under one week of age is usually high. Gasping and sneezing are important symptoms. In examining chicks, yellowish exudate is found in the bronchi, air sacs, and heart sac. In contrast, there is usually yellowish exudate in the larynx in laryngotracheitis in chicks.

Typical cases of bronchitis in growing stock and adults cause negligible mortality.

* Reprinted from *Feathcredfax* and *National Poultry Digest*.

Bronchitis is often erroneously diagnosed as coryza. Coryza, however, is a bacterial disease, possibly caused by *Hemophilus gallinarum*. In coryza the sinuses below the eye frequently become enlarged by an accumulation of pungent, cheesy material which eventually destroys the eye

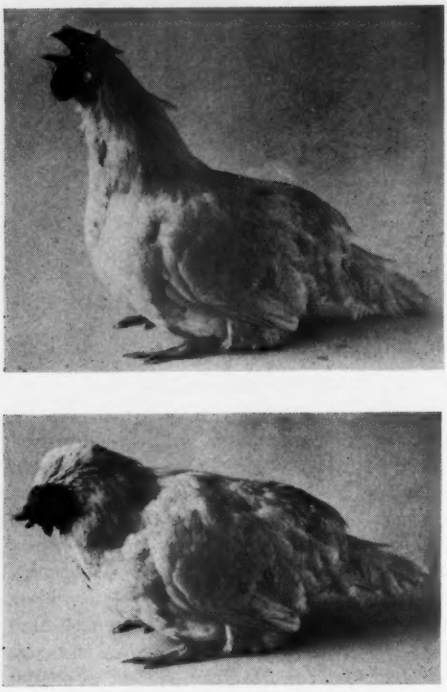
A chick affected with bronchitis

Loud rattling and gurgling noises are produced in the trachea. There is considerable coughing, and some birds show a nasal discharge. Egg production and appetite are severely affected. The latter usually returns in a few days, but return to good egg production may be delayed four to eight weeks. Subsequent to an acute outbreak, the shell texture, shape, and hatchability of the eggs are frequently adversely affected.

Post-mortem examination reveals a great excess of clear or slightly cloudy mucus in the trachea. In laryngotracheitis, the tracheal exudate includes also blood and yellowish material and the mortality may be high. The symptoms, character of the tracheal exudate and the rate of mortality usually serve to differentiate bronchitis from laryngotracheitis. Difficult cases require animal or egg inoculation to arrive at definite diagnosis. An early differentiation is important because in outbreaks of laryngotracheitis it is frequently possible to vaccinate nonaffected pens and stop the spread of the disease.

The present suggestions for treatment are as follows: 1. The birds should be kept warm and comfortable. 2. Every effort should be made to stimulate feed consumption, particularly through the use of wet mashes and milk products. 3. Vitamin A should be supplied through feeding oils and greenstuffs

if any possibility of deficiency exists. Dusting powders and sprays are of questionable value.



Infectious laryngotracheitis: Above, attitude during inspiration; below, attitude during expiration.—*From Calif. Agr. Ext. Circ. 8*

Bronchitis offers a special problem in broiler plants. Eradication and prevention of bronchitis in laying flocks is difficult in some communities. The same plan that is used for laryngotracheitis is recommended and has proved successful in a few cases. In breeder-hatcher units, precautions begin in the incubator room when the chicks are hatched. The basic problem is the separation of the chicks and adults, but caretakers must exercise caution so that infection is not carried to the chicks. Plans should be made to dispose of or isolate the survivors of an outbreak and clean and disinfect the houses before the non-infected population is housed. Satisfactory vaccines for the prevention of bronchitis are not available. Birds immune to laryngotracheitis are not immune to bronchitis.

Poultry Mortality Increasing

Laying house mortality of poultry has been on the increase during recent years. During these same years it has been reliably estimated that American poultrymen and farmers have been spending in excess of $10,000,000 annually for drugs, medicine and many so-called remedies that have no proved therapeutic value.

If the millions of dollars spent for these remedies has achieved the goal desired by the purchaser, most certainly the results would be reflected in a diminished mortality. On the other hand, mortality has gone up and the sale of remedies and medicines for poultry has increased. I am of the humble opinion that this "medicine mindedness" has had much to do with the failure of the farmer and poultryman to control many poutry diseases. They have placed too much faith in the bottle in which the remedy comes and not enough faith in cleaning, sanitation and hygiene.—*J. Holmes Martin,* in the *U. S. Egg and Poultry Magazine.*

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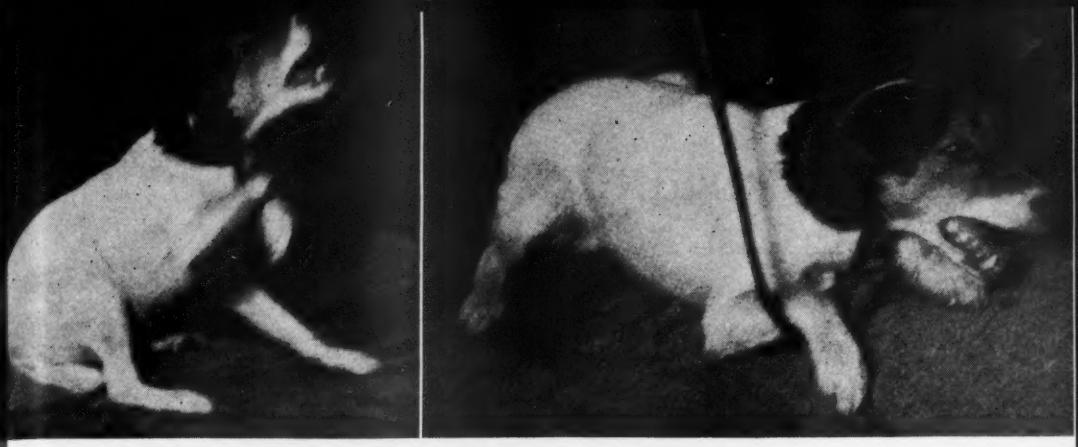
Breeding for Stamina

Breeding for disease resistance should not be confused with breeding for stamina, vigor and vitality. Many times the animal which appears most vigorous is among the first to be attacked by some virulent infection.

No adequate measure or yardstick has as yet been proposed to determine the vigor or vitality of an individual bird. To be sure, we all have general notions of "pep," brightness of eye, sturdiness, general good health, depth of head, broad breast, and many other qualities that are ordinarily associated with vigor.

That vigor of itself is no guarantee against the hazards of disease is amply shown when we remember that the Pit Games have been bred for vigor and stamina through more generations than any other breed of chickens. Even with all of this breeding and concentration of the factors for vitality, Pit Games succumb to such diseases as pullorum, coryza and fowl paralysis quite as quickly as do our other breeds of chickens which are not thought to be so vigorous.—*J. Holmes Martin,* in the *U. S. Egg and Poultry Magazine.*



A Few Notes on Rabies

Only 90% of the brains of rabid dogs reveal Negri bodies, even upon the most expert examination.

A clinical diagnosis of rabies by an experienced veterinarian should be accepted as final even though other tests are negative.

It takes three days after the onset of symptoms of rabies for Negri bodies to develop. A good many affected dogs are killed, and some die before the expiration of this period, consequently no Negri bodies are found when their brains are examined.

If dogs with furious rabies are permitted to live till they die of the disease, Negri bodies can practically always be found in the brain. In 20% or more of the cases of dumb rabies death occurs before Negri bodies have time to form. A case illustrating this distinction occurred several years ago in the middle west—the brain of a dog, diagnosed by a veterinarian as having rabies, was examined. A report of "No Negri bodies" was made. This was accepted as meaning "No Rabies." Later, a child who had been bitten by the dog, died of rabies.

The International Health Division of the Rockefeller Foundation, cooperating with the State Board of Health at Montgomery, Alabama, has tested most makes of rabies vaccine which are on the market. Much variation was found. The poorest showing was made by a brand used on 50 dogs with 50 controls, of which 38 vaccinated dogs and 25 controls survived. The best showing was made by a brand used on 100 dogs with 100 controls; 96 of the vaccinated dogs and 50 of the controls survived.

North Carolina has a state law which requires that all dogs be vaccinated for rabies. The law also states that the county health commissioner shall appoint a certain number of registered veterinarians to do the vaccinations. On certain days stations are set up in various parts of the county so as to be readily accessible to all dog owners. A fee of 75 cents is charged, but this can be deducted from the state tax on live stock, so that practically the service costs the owner nothing.

The dog shown in the illustration was brought to the hospital of Dr. O. N. Christensen, Wilmette, Ill., one night last March. It was suffering from rabies of the furious type but became a paralytic the next day and died 36 hours after the photograph was taken.

Doctor Christensen relates an interesting experimental treatment of a case of rabies in a St. Bernard. This animal was brought to his hospital near the end of the excitable stage of rabies. The symptoms were typical and unmistakable. It was judged the animal had 24 hours to live and certainly could not live longer than 48 hours. A large dose of sulfanilamide was administered and the treatment continued three times daily for eight days, when the animal succumbed. It seems indubitable that the sulfanilamide prolonged the life of this particular dog six or seven days.

Recent Materia Medica

XV. Miscellaneous Hormones

Pancreas

By PROF. VICTOR LEWITUS
Nutley, New Jersey

ALTHOUGH diabetes has been known since ancient times, having been recognized by both Egyptian and Greek physicians, it was not until the year 1869 that Langerhans discovered that the inability of the body to metabolize sugars was due to insufficiency of the tiny ductless glands which he found in the pancreatic tissue. It has long been known that disease or removal of the pancreas will invariably cause diabetes in dogs. It is common knowledge that Banting and Best in 1921 succeeded in extracting insulin from domesticated animals. Upon injecting this hormone into depancreatinized dogs the appearance of sugar in the urine was eliminated. Of course, it was also noticed that injections of insulin had to be continuous for the animals to survive. This discovery was quickly utilized in the treatment of human beings, and today the life span of an insulin-treated diabetic can be extended to that of a normal person. The general symptoms of diabetes mellitus or hypoinsulinism include polyuria, polyphagia, polydipsia, weight loss, neuritis, hyperglycemia, glycosuria, and eventually coma. Acidosis is indicated by the presence of acetone and diacetic acid in the urine, and there is a reduction in the CO_2 combining power of the blood. When insulin overdosage occurs or hypoglycemic shock is produced, the condition of hyperinsulinism is encountered. The symptoms include weakness, perspiration, trembling, subnormal blood-sugar levels, etc. Convulsions and coma may supervene. Large amounts of sugar counteract an attack. Besides excess insulin, hypoglycemia may be caused by disorders of the adrenal glands, organic nervous disorders, and deficient glycogenesis. Because the effects of insulin are transitory, attempts have been made to find substitutes for it. Protamine insulin, developed by Hagedorn in 1936, is insulin mixed in solution with monoprotamine obtained from trout sperm. The subcutaneous tissue fluid dissolves the material slowly, making it available gradually and prolonging the effects. Even more tardy in action is protamine zinc insulin. Whereas the requirement of protamine insulin is about 15% less than that of insulin, the zinc combination is required in amounts from 30 to 40% less. Mosenthal and Mark reported recently that this form of insulin not only exerts a more favorable effect on diabetes than regular insulin, but it also seems to benefit the clinical course of complicating tuberculosis. Scott and Fisher observed that zinc exists in the pancreas and is present in the insulin crystal. Care is required in avoiding overlapping of dosage. Latest of all such preparations is crystalline zinc-insulin, intended chiefly for diabetic patients who are allergic to unmodified forms of insulin. It has been marketed since 1938. A recent modification of insulin called globin-insulin is made from insulin and thymus proteins. This is more popularly used in the South American countries. Besides being used for diabetes, these preparations have been employed in treating narcotism, alcoholism, certain vasomotor disturbances, non-specific malnutrition, myasthenia gravis, and spontaneous hypoglycemia.

Some interesting work by Young in 1938 showed the possibility of producing permanent diabetes in normal dogs following intraperitoneal injections of extracts of beef anterior pituitary glands. Though larger doses of insulin are required to maintain these animals, withdrawal of the drug permits a longer survival period. Best and coworkers have confirmed these findings; in fact, they found that extirpation of the pancreas of such animals does not increase the severity of the diabetic symptoms caused by the anterior pituitary injections. These findings indicate that the anterior lobe of the pituitary has a diabetogenic function.

"Lipocaic"

Ever since insulin became available, it has been observed that pancreatomized dogs differ from human diabetics. Though the

glycosuria in dogs can be controlled with insulin, the animals soon die. In 1924, Fisher showed that such animals died from fatty infiltration of the liver; and Allen and others showed that such hepatic lesions could be prevented by feeding generous portions of raw pancreas to such animals. More recently, the constituent of the pancreas active in this respect has been considered to be choline, but Dragstedt claims that some constituent which he calls "lipocaic" (an alcoholic extract of the beef pancreas) is responsible for the cures. Snell and Comfort have recently found fatty degeneration of the liver in human beings suffering with chronic pancreatitis. Clinical manifestations included foul fatty diarrhea, enlarged liver, etc. These cases lend themselves to treatment with this newly discovered principle.

Recent work has shown the possibility of the existence of a urinary hormone which is thought to originate in the pancreas. It is termed the "circulatory hormone" since it appears to exert a distinct vasodilator effect upon the peripheral vessels of the skin, muscles, heart, lungs, and brain. It seems that this hormone aids in uniform distribution of the blood, and there is an associated fall in pressure. Furthermore, there is a concomitant increase in muscular temperature, indicating heightened metabolic activity. The substance is indicated in peripheral vascular disease, ulceration, incipient gangrene, arteriosclerosis, etc.

Liver

In 1927 Minot and Murphy announced their important discovery that liver therapy is highly effective in pernicious anemia. Since that time many attempts have been made to isolate the active constituent. Fraction G of Cohn, used orally, proved to be extremely effective, and further purification of this fraction resulted in a product that could be injected intravenously. Since this groundwork was laid, much chemical purification has been attempted. However, the primary factor has not yet been crystallized and so the nature of the active liver component(s) is still obscure. Some interesting work by Collip, Selye, and others has shown that partial hepatectomy (70% of the liver being removed) results in typical fatty degeneration as early as 24 hours postoperatively. This reaction has been noted in dogs, rabbits, and rats. Animals well nourished previous to operation show less fatty livers than those that have fasted. When water is denied animals, the response of fatty degeneration is further exaggerated. The reaction occurs independently of the adrenals or pituitary functions.

Spleen

The spleen contains a glycolytic hormone which causes the blood sugar of normal individuals to fall 20 to 30% below normal levels. It is thought that the spleen is at times capable of taking over the functions of the parathyroid glands in so far as the calcium metabolism is concerned. When splenectomy is performed in dogs, hypocalcemia results; and this condition can be alleviated by feeding desiccated spleen substance, the blood calcium rising to a point within normal limits. So-called "Howell bodies" have been noted in erythrocytes after splenectomies, indicating some form of hormonal relationship between the spleen and the bone marrow. Leake believes that the spleen elaborates an erythropoietic hormone from red blood cells which it destroys. Troland and Lee reported in 1938 a platelet-reducing substance called thrombocytopen. They found it in the spleens of patients suffering with idiopathic thrombocytopenic purpura. When acetone extracts of the spleen of such individuals were injected into dogs, cats, rabbits and monkeys, there was a distinct fall in the platelet counts. Normal spleen extracts do not induce such a response. Rose and Boyer and others have recently confirmed such findings. They injected such abnormal splenic extracts into rabbits and found that the platelets dropped markedly in number.

Renin

The existence of kidney hormones has been suspected for a long time. From Goldblatt's experimental work in dogs and monkeys, in which hypertension was produced by constricting the main renal arteries, it appears that a humoral mechanism is responsible for the production of such hypertensive states. This has been substantiated by the fact that ischemic kidney(s) must be present for hypertension to develop or be

maintained. Furthermore, when both renal arteries and renal veins are occluded, uremia without hypertension develops, and this again illustrates that there is probably some hormone present in ischemic kidneys to cause hyperpiesis. Helmer and Page have recently (1939) obtained preparations of the kidney which exhibited marked pressor activity. This material is called renin. This pressor principle acts only in the presence of whole blood or plasma, or the filtrate of laked erythrocytes, showing that the proteinaceous substances are required for complete pressor action on the part of the renin. Page calls these other substances renin-activators. Renin plus renin-activator produces a strong pressor substance called angiotonin. Incidentally, the kidney is also considered to elaborate an inhibitor of renin and angiotonin. Page and Helmer have shown that following infusion of both of these principles into normal, hypertensive, and nephrectomized animals the pressor response is least in the normal animal and greatest in the nephrectomized animal. This demonstrates the probability of an inhibitor substance produced by the normal kidney. The pressor effect of renin is independent of the nervous system, the pituitary gland, the pancreas, the liver, or the presence of the kidneys themselves. For example, Page and others have found that the action of renin is heightened if the kidneys are removed from the animal two or three days previous to injecting the renin. Repeated injections of renin diminish the pressor response, suggesting the formation of an antihormone. Merrill, Williams and Harrison have studied the intrinsic circulation of the kidney and have found two pressor principles, renin and a tyramine-like substance. The former elevates the blood pressure and causes the kidney to swell; the latter causes shrinkage in volume of the kidney, and reduces renal circulation. An altogether different hormone has been reported recently by Ivy and others (1940). This substance, urogastrone, obtained from kidney excretions, can stop gastric acid secretion and thus possibly aid in the healing of peptic ulcer. It has been used subcutaneously. Sandweiss recently reported that when urogastrone was administered to 125 dogs with stomach ulcers, all were relieved.

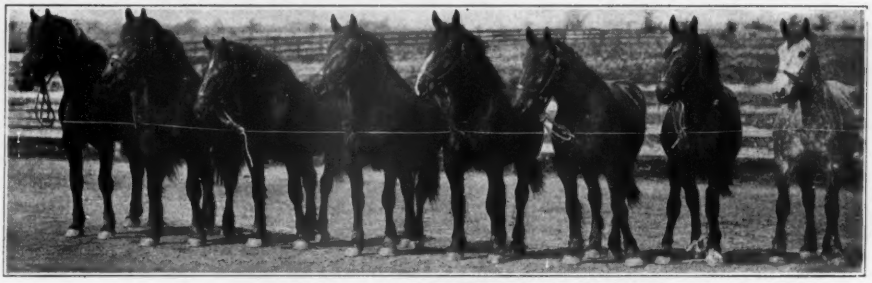
Pineal

The pineal gland is still not well understood, but it is thought to secrete a hormone which is antagonistic to the effects of the anterior pituitary functions, particularly sexual development. Hence it has been suggested to inhibit hypersexuality in animals as well as to abort estrus under certain conditions. Tumors of this gland have led to precocious bodily and sexual development. During early life, the pineal gland controls opening of the vaginal orifice, descent of the testicles, opening of eyes and ears, eruption of teeth, etc. Like the thymus, it involutes at an early stage in development. Dandy has found no decisive effects following pinealectomy in dogs, but Horrax has found accelerated development of the sexual organs in male guinea pigs. Ox pineal gland causes tadpoles to become translucent. In rats, sex excitation and early breeding follow intraperitoneal injections: precocious dwarfism, irritability, and eye diseases occur in subsequent generations.

Thymus

There is probably no organ, aside from the pineal body and spleen, which is so enshrouded in mystery as the thymus gland. Though its anatomical relationships and histological structure are well known, its physiological functions and pathology are not well understood. Rowntree and others have shown that thymectomy in animals produces genital hypoplasia, enlargement of the adrenal cortex, compensatory hypertrophy of the thyroid gland, and retardation of growth in successive generations. X-ray treatment of the thymus in rats has resulted in retarded development of the gonads. Administration of thymus extract produces in the young of successive generations of rats acceleration of growth and of adolescence and increase of fecundity. When the adrenals of rabbits are excised, not only is thymic involution prevented, but hyperplasia of the involuted thymus follows. Castration in male rabbits is followed by hypertrophy of the thymus. This is also observed in the human eunuch. Thus far, no actual secretion from the thymus has been demonstrated. Sudden death in both humans and animals was once thought to result from thymic dysfunction, but this is untenable.

Experiments with Phenothiazine in the Treatment of Horses For Strongyles



By VIRGIL B. ROBINSON, Veterinary Science Department and JOHN M. KAYS, Animal Husbandry Department

College of Agriculture, University of Missouri
Columbia, Missouri

IT IS doubtful that any drug for veterinary use has ever had more publicity and fallen into more common usage than has phenothiazine in the last two years. Two years ago the Bureau of Animal Industry published a report of their work with phenothiazine in removing parasites from the intestinal tract of sheep and reports on its use in other domestic animals followed in quick succession. Up until that time the drug had been in use only as an insecticide, and it still was not available for general distribution. Now it is reported that some distributing houses are ordering phenothiazine from the manufacturer in carload lots.

Judging from the abundance of experiments with favorable results, phenothiazine has justly been highly acclaimed for its efficiency in removing parasites from the intestinal tract of animals and at the same time for its low degree of toxicity. It is conceivable, however, that some of the dangers of extensive and promiscuous usage have not yet been discovered; and field reports of untoward effects from its use bear this out.

Use of Phenothiazine in Equine Strongylosis

Errington and Westerfield[2] found that phenothiazine definitely lowered the red blood count and the hemoglobin content of the blood in proportion to the amount given, but yielded remarkable results in removing strongyles. The red blood cell count and the hemoglobin content returned to normal in about four weeks.

Swales[3] stated that phenothiazine is particularly effective for strongylosis and perhaps of some value for ascariasis in horses, although it is not as effective for the latter as carbon disulphide. He also stated that phenothiazine is definitely constipating and that some laxative should be given along with the treatment to decrease the absorption of the drug and thus to help avoid objectionable symptoms. He attributed the bronzed or yellow membranes that follow the use of the drug to the anemia found by Errington and Westerfield, and suggested that considerable caution should be observed in cases where anemia is already suspected. He noted that various degrees of abdominal pain have been observed following the use of the drug.

Howell and Britton[4] reported a remarkable reduction in egg counts, especially of strongyles, when phenothiazine was ad-

[1] Harwood, Paul D., Robert T. Habermann, and A. C. Jerstad, 1939. Efficacy of commercial phenothiazine in the removal of roundworms from sheep. *Vet. Med.* 34:7, pp. 440-443.

[2] Errington, B. J., and Clifford Westerfield, 1940. Phenothiazine as an anthelmintic for horses and mules. *Vet. Med.* 35:12, pp. 688-693.

[3] Swales, W. E.,. 1940. The use of phenothiazine in veterinary parasitology. *Can. Jrnl. of Comp. Med.* 4:12.

[4] Howell, C. E. and J. W. Britton, 1940. A field trial with phenothiazine as an equine anthelmintic. *Cor. Vet.* 30:4, pp. 526-533.

ministered in a herd of 45 horses. Doses of from 45 to 80gm were given mixed in the feed and most of the horses ate the mixture without objections. No toxic effects were observed in this experiment.

The Department of Veterinary Science at the University of Missouri has received several reports of toxic effects from phenothiazine administered by laymen during the last winter. One owner reported the loss of four of six horses treated with the drug. The horses died within five days after treatment, and it was the opinion of the attending veterinarian that the phenothiazine administered by the owner was the causative factor. The dose in this instance was said to have been 50gm.

Experimental Procedure

Most of the horses in the University of Missouri horse barn were treated with phenothiazine to remove strongyles in January, 1941.

Some objects of these trials were to determine the efficiency of phenothiazine in removing strongyles; to find out something about the minimum dose required for a successful treatment; and to determine efficient methods of administration.

The horses in these trials varied in age from weanlings to animals 20 years of age, and included percherons, saddle horses, and two weanling mules. Because the doses used in these trials were small they were not graduated according to age.

Phenothiazine should always be administered with caution, especially when there are symptoms of anemia, say Robinson and Kays; but they conclude from the results of their experiments that if the drug is given to horses in small doses while the bowels are in a laxative condition, the danger of toxic effects appears slight.

TABLE I.—STRONGYLE EGG COUNT.

Horse No.	Ages	Anthelmintic Used	Average Egg Count Per Field: Before treatment	1 wk. after	3 wks. after	5 wks. after
1	10		4.4	0	0	0
2	10	50 Grams	5.5	0	0	.5
3	3	phenothiazine	1.2	0	0	
4	13	in feed	2.5	0	0	
5	Yrlng.		2.2	0	0	
6	2		1.9	0	.1	.?
7	2	30 Grams	1.0	0	0	.2
8	8	phenothiazine	1.9	.1	0	.2
9	Weanling	in feed	3.2	.2	0	.5
10	3		2.9	.2	0	
11	2	25 Grams	1.0	0	0	.8
12	2	phenothiazine	1.6	0	0	.6
13	Yrlng.	in feed	3.0	0	0	.3
14	5	both morning	3.4	0	0	
15	5	and evening	2.0	0	0	.2
16	Weanling		3.9	0	.1	.4
17	2		1.4	0	0	
18	Yrlng.	25 Grams	2.7	.4	.3	
19	Yrlng.	phenothiazine	.6	0		
20	Yrlng.	in capsule	.9	0		
21	Aged		2.9	0		
22	Weanling	20 Grams phenothiazine	5.4	0	0	0
23	Weanling	Two doses	4.3	0	0	0
24	2	Two wks. apart	5.9	0		
25	2	Control group given	3.9			
26	2	30 grams	1.4			
27	Yrlng.	phenothiazine	2.5	1.0	0	
28	2	in feed	1.6	.9	0	
29	Yrlng.	after second egg count	8.6	4.4	0	
30	22		3.7	0	.2	.5
31	2	Oil of	4.6	3.3	1.9	
32	10	chenopodium	2.7	0	.1	0
33	3		2.5	.7	.1	0

For three feeds before treatment the horses were fed a ration consisting of one-half bran, in order to produce a laxative condition of the bowels. This was done in an effort to prevent undue absorption and to increase permeation of the bowel content by the drug.

Five horses were used as a control group. Four others were given the recommended dosage of oil of chenopodium in linseed and mineral oil. Five received 50gm each of phenothiazine mixed into the feed by hand. Five were given 30gm each in the same way, and five received 25gm in both morning and evening feeds. Single doses of 25gm in a capsule were given to each of five horses. Three received 20gm each mixed in the feed and a second dose of 20gm two weeks later.

An effort was made to have both young and older horses represented in each group. A few of the horses given the drug in the

feed did not clean up all of their feed in the morning; however, these few finished it in the evening when they were stabled for the night.

Strongyle egg counts were made on fecal samples from all of the horses prior to treatment and at one, three and five week intervals after treatment, using the flotation method, with saturated salt solution. Ten microscopic fields were selected at random for counting, and the average of these ten are listed in Table I. The control group was treated with 30gm of phenothiazine in the feed after the second count had been made.

Some of the horses were moved to a farm several miles away before the experiment was completed; this accounts for the omission of data on these horses in the last two counts.

No. 21 was an aged mare and was to be destroyed about two weeks after treatment. She was given 25gm of phenothiazine in capsules. No attempt was made to produce a laxative condition of the bowels of this mare. Fecal counts were made again one week after treatment. Two weeks after treatment she was destroyed and the intestines closely examined for parasites. A few bots were found in the stomach and eight strongyles in the large intestine.

No toxic effects were observed in any of the horses in these trials. This may possibly be attributed to the small dosage and to the laxative condition of the bowels at the time of administration.

Summary and Conclusions

The egg counts indicate that phenothiazine in doses as small as 25gm is fairly effective for the removal of strongyles in horses.

A slight increase in the egg count was observed after five weeks. Since the temperature was below freezing most of the time, the indications are that the larvae begin to return to the intestine from the body tissues in appreciable numbers in about five weeks.

Phenothiazine may be given in the feed, but to insure accurate dosage the powder may be administered easily in capsules and the liquid by stomach tube.

Phenothiazine should always be administered with caution, especially in cases showing symptoms of anemia; however, if given in small doses while the bowels are in a laxative condition, the danger of toxic effects appears slight.

* * * *

Potato Poisoning in Horses

Poisoning of horses running on potato fields has frequently been reported from the San Luis Valley of Colorado, where it is most prevalent in the fall after the culled potatoes have had a chance to undergo freezing and thawing. There may be some recurrence in the spring, at the time the ground is thawing out.

The symptoms are usually incoördination of gait and paralysis of the throat; while the animal attempts to eat and drink, it may be unable to swallow. Usually, constipation is associated with the poisoning. The weakness continues until the animal goes down; death follows in a short time. There is no rise in temperature. There are no cerebral symptoms such as are shown in encephalomyelitis.

It is dangerous to drench animals in this condition, because of the paralysis of the throat. When medicaments are administered, they must be given through the stomach tube. The promotion of elimination, from both the bowels and the kidneys, is desirable. Some animals recover under treatment.

Potato plants contain the same poisonous substance as the nightshades and other solanums, the alkaloid "solanin." This occurs in dangerous amounts in unripe and green potatoes. It may develop in tubers left on the ground after digging and exposure to the sun. Wilted, green stems and leaves also contain the poison.

It is unsafe to run horses on potato fields after the potatoes have been dug. Keeping horses off potato fields and preventing them from eating spoiled potatoes which are sometimes thrown out of cellars in the spring will prevent development of the poisoning.

The foregoing is taken from Bulletin 455, Colorado Experiment Station. To it may be added that in potato growing sections horses used in hauling potatoes to the freight cars are not uncommonly poisoned by eating tubers while waiting for unloading. The belief is universal among growers that the tubers when sunburned (green colored) are more toxic than otherwise. To the symptoms given may be added also labored respiration.

Difficult Calving

By E. T. BAKER, Moscow, Idaho

PERHAPS no branch of veterinary science presents so many puzzling problems as does obstetrics. Each case requires "rugged individualist" treatment, and no set rules can be laid down for handling it. Obstetrics, therefore, must be learned the hard way, which is by actual experience. However, if one is willing to learn by observing the technique of men who have been through the mill, he will know what to expect and, in a general way, be prepared to meet it.

In our younger days we were fortunate enough to become acquainted with Dr. John Wood, of Walla Walla, Washington, who 30 years ago, had one of the largest general practices in the northwest. He was over six feet tall, with arms to match, and in those days handled many cases of dystocia, most of them in the mare. We were doing some tuberculin testing for the state in his vicinity and took the opportunity to go out with him on some of these calls. The information picked up by helping him has proved invaluable ever since. When Dr. Wood passed away several years ago, the profession lost a valuable and competent member.

Being six feet tall, and keeping in fair condition by bowling all winter, we have been able to meet our obstetrical problems in a generally satisfactory manner. We have confidence in our ability to handle these everyday cases, and to profit by our mistakes in the past. By this, we do not want to convey the impression we know it all, but we do know from past experiences what conditions to expect, and how to meet them. Also, we can determine the impossible or hopeless cases in a very short time, and thus inform our client.

Obstetrics in General Practice

Strange as it may sound, we like obstetrics in large animals. Of course, when we find a cow stretched out in a snow drift, with the weather flirting around zero, we do not become overly enthusiastic about this branch of our profession, but merely take it as a matter of course.

With the exception of the ewe, we dislike obstetrics in smaller animals. When we receive a call to see a sow trying to have her first litter, we do some of the finest sidestepping imaginable. If possible, we induce the owner to load her up on a truck and take her over to the college clinic. In the first place, many of these cases are almost moribund when we are called, and we may miss one or two good paying calls while fooling around a twenty dollar sow. Not having a small animal hospital or equipment to handle dogs or cats, we pass these up also. However, not living in an extensive swine raising community, and having very few canine or feline obstetrical cases, we are not impoverished by losing this type of work. If the college clinic were not so close—only ten miles distant—we would, of course, make arrangements to handle anything that came along.

Twenty-five years ago, we frequently had more equine than bovine cases, but during the past ten or fifteen years, most of our obstetrical work has been among cows and ewes. Of course, one cannot charge as large a fee for ovine cases, but they help to make friends and build up practice.

Educating the Public

Years ago we decided much of this talk about being the "servant of the public" was mostly hooey. True, we are here to render veterinary services to those who may want them, but we do not consider ourselves a slave to run at their beck and call.

Therefore, we began to impress upon our clients the value of calling us early to their sick or injured animals, particularly in obstetrical cases. We would explain to them that if we had to work all day or night, we might miss some good calls, as well as run the risk of contracting blood poisoning from a decayed fetus. Not only that, we would add, but the chances of saving the mother would be reduced to almost zero. Also, we pointed out the many complica-

tions that may accompany difficult birth, and why "pullin' a calf" by main strength and awkwardness often results in a quiet country funeral. If we were called early, say an hour or so after the first symptoms were visible, we would all gain by the transaction. Saving the calf, even if it proved to be a bull which later would be vealed, would more than pay for our call, and the cow would soon be filling the milk pail.

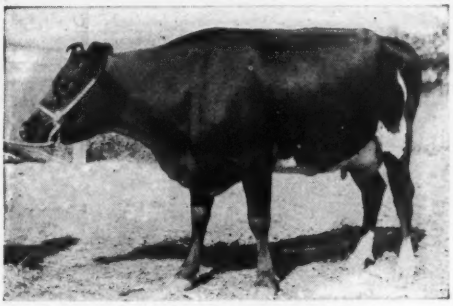
On our part, we would pay strict attention to business, and be available when wanted. Nothing ruins a practice more quickly than building up a reputation for never being at home when wanted.

As good fortune would have it, one of the first farmers to call us early happened to be a leader in the community. He had a fine Guernsey cow trying to calve, and he called us about an hour after he noted her condition. We found one foot turned back and corrected this, and were soon back home again with a ten dollar check. The calf lived; the cow was back to normal milk production in a week; and everyone was satisfied.

Another thing we suggested to our clients was to keep the cow about to freshen in a clean shed or barn. In this way, she could not get in a mud hole or a creek. Even in summer this is good practice, for, if help is needed, it can be rendered far better than in the middle of a forty-acre pasture, or wedged up against a barbwire fence.

We have also told many of our clients how to feed the calf to get the best results, having asked the dairyman at the university how he handled them. He told us he left the calf with the cow for four days, in order for it to get the first milk, and then he placed it in a clean stall or shed. For feed, ten pounds each of ground oats and barley, five pounds of bran and twelve and one-half pounds of dried butter-milk were mixed together. The young calf was given a quart of warmed whole milk twice daily, and started off on a handful of the grain mixture, gradually increasing the amount in accordance with what the calf would clean up. At six weeks the milk was discontinued; by then the calf was eating hay and over a pound of the grain mixture, with sufficient salt, per day. It would be sleek and fat, making fine veal, or, if a heifer, develop into a good cow.

We find the younger generation more willing to call us at the first signs of trouble. They realize that the sooner help is given



A good rope halter, using about 15 feet of rope, is handy for restraint

the less expensive it will be, and the more satisfactory to all. Their fathers, who had to depend on their own efforts in the early days, when expert assistance was not available, usually waited until the patient was almost dead before calling a veterinarian.

We are emphasizing these facts, because the average practitioner can neither walk on water nor raise the dead, and without the early cooperation of the owner, obstetrics becomes a distasteful subject. Being able to look back 30 years gives us a clear perspective of good and bad conditions. Of course, they are not ideal at the present time, but we can note great improvement in our territory.

Clothing

If possible, we like to dress for the occasion at home. In winter we keep some of our clothes in a back room. As we live in a college town, most of our dairymen have their cows freshen from July to October, and that is when most of our cases occur. In cold weather we wear a rubber suit, but in hot seasons we wear old clothes that can be discarded if too soiled.

Winter or summer, we wear four-buckle hightop rubber shoes, as they protect the legs and shoes. We also use aromatic antiseptics, and when we get home, we wash with tincture of green soap, and apply liquor antisepticus to our hands and arms.

Clothing is a mighty important factor in this phase of practice, and one should be fully prepared for any emergency.

Poor position in which to attempt delivery. (This cow finally got up)

Equipment

We have a ten-quart aluminum bucket which we have used for some years, four 30-inch obstetrical chains, three ten-foot halter chains with three snaps, a wire stretcher, a heavy halter with a 15-foot rope, an embryotomy knife, and one two-bit curved pen knife which we use about as much as any other instrument. It is especially handy to reach in and eviscerate the lungs when the fetus is wedged in at the shoulders.

We also have a set of homemade hooks, repeller and chisel, which we seldom use, and a big, expensive pair of obstetrical shears which was given us as a present many years ago but which has never been used. We do employ quite frequently a short dull hook and a sharp hook, with sash cord ropes. These are used to slip in the uterus, when the head of the fetus is down, and difficult to raise up. Unless absolutely necessary, we use only the dull one for this purpose, as it can be hooked in the eye socket of a dead calf.

We have never used a fetotome or other fancy instruments. In theory, many of these instruments are fine, but in practice they are entirely different. Many of our cases are young heifers, often bred too young, and one cannot even insert the hand in the uterine cavity, much less any instrument. In mature cows, with large, roomy wombs, and which will stand up while all kinds of work is being done, some of these instruments will be found valuable.

Proper position of the patient, a good right arm, a few dependable instruments, and a lot of good luck will be found much better than an elaborate outfit that you don't know how to use.

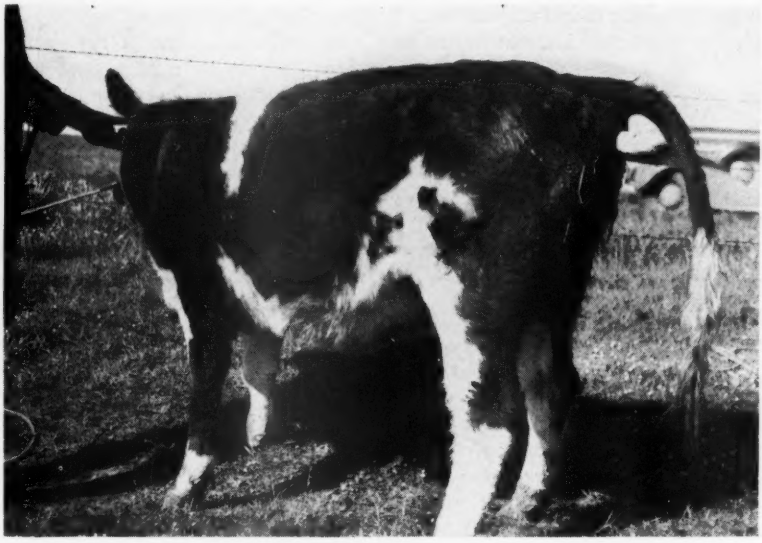
What to Expect

We have probably handled around a thousand cases in large animals, and we have learned to expect one or more of the following four conditions:

1. Wrong position of the fetus, such as the head or a foot turned back.
2. Too large a fetus, in either normal or abnormal position.
3. Monstrosities, which do not occur very often, but are more commonly found in the beef breeds.
4. Various complications, such as milk

fever, eclampsia, septicemia, or mastitis so painful as to prevent normal labor efforts.

In possibly one out of every ten cases, a dead fetus is found. This occurs more often in summer, when the animals are out on pasture, and in young heifers which are not usually brought in with the milk cows.



Good position for delivery, with hind feet protruding. First one hip, then the other is brought past the pelvic outlet

Delayed Parturition

There is a peculiar condition found in nervous mares or cows, where parturition seems imminent, but no water bag appears. If the animal is not straining, and there are no apparent symptoms of a malposition of the fetus, we merely give the patient 500cc calcium gluconate and dextrose in the shoulder, massaging well. To a mare, we give one or two capsules filled with granular calcium gluconate and a little chloral. We do not like to administer an intravenous injection in these cases, for if anything happens within the next six months, it will be blamed on "that there dope Doc shot in her neck."

Usually, these cases happen about dark, and we treat them as described and then go home. Almost invariably the owner calls up the next morning and tells us that the cow has a lively little calf and seems to be "doin' all right."

However, if the patient is found straining the next morning, we make a manual examination. If the os uteri is not dilated, we repeat the treatment, and leave her alone for another 12- to 24-hour period. We may also give her some sterile ethereal camphorated oil and a bovine Reek's capsule. If the os is dilated, we make a thorough examination, and if a malposition is found, we attempt to correct this and deliver the fetus at once.

In these cases of delayed parturition take things easy and give nature a chance. Do not try to force the issue, but merely assist nature, and in about nine times out of ten the termination will be satisfactory.

We are all familiar with the owner who knows it all, and who drafts Grandpappy, Uncle Zeke and the hired man to help him "git that thar calf." So they work and sweat and cuss for several hours, and finally "pull out" the calf—and also the uterus and "all the works," as they excitedly tell us over the 'phone. At this joyful news, we make a few appropriate remarks under our breath, and then get ready for a "pushin'" instead of a "pullin'" job. We might add that the owner pays extra for this, as we allow him nothing for his misguided efforts.

Years ago we used to lose most of these cases in our practice. We did not have gluconate, with its almost miraculous effects on the uterine muscles, but "popped in" plenty of pituitrin, ergot and strychnine.

Just a week or so ago, a client called us to see a five-year-old Jersey cow. She was about ten days overdue, but, with the exception of a little nervousness, there was no symptom of anything wrong. We gave her the gluconate and dextrose, and the next morning she had a fine calf. Had we worked ourselves into a dither and tried to "git it" before nature was ready, the outcome might have been tragic.

Preparation of Patient

Twenty minutes spent in preparing the patient and getting her into a proper position will return large dividends after the actual work has started. If possible, we like to have our animal in a large box stall.

First of all, we place our large rope halter on her, and tie her to a post or manger with a slip knot, so that if she throws herself, the knot can be untied before she suffocates.

Second, we inject 500cc (in large cows) or 250cc (in smaller ones) of calcium gluconate and dextrose in the shoulder, massaging well. If she is extremely nervous, we give her a capsule of equal parts chloral and gum acacia. If these precautions are taken, there will be little danger of eversion or shock. In cold weather, and in weak cases, sterile camphorated oil and a Reek's bovine capsule may also be given.

We then make arrangements to attach our wire stretchers to some convenient place. This can be done easily with plenty of strong halter chains and numerous snaps.

Next, our bucket of warm antiseptic solution is placed near, with the obstetrical chains on the side of the bucket. We also lay out our various instruments—though we seldom use them, but they make a fine impression on the client. We also like to have a couple of gunny sacks handy to wrap around the chains so that the owner can pull and find out how hard the job really is. He is usually more willing to pay the bill if he realizes the amount of work involved.

If possible, we have our patient headed down hill, with several sacks of hay or straw placed under her belly, so that if she takes a notion to fall down, her hind parts will be slightly elevated.

But, you ask, what if the patient is out in a field, or down in a mud hole, or out in the barnyard, between an old mowing machine and a barbwire fence?

When this occurs, we take time out to get her into a workable position. To attempt to deliver a calf from a cow stretched out on her side in the mud calls for more physical effort than we care to make. Of course, when we were young and full of pep, and believed in using our back more than such brains as we have been endowed with, it was a different story; but "them days is gone forever."

The Actual Operation

With everything in readiness, the preliminary examination is made. Do not wear yourself out doing this. Work a few minutes, and then take a rest to think things over. In some cases, the cow may start straining, and the fetus may change just enough to make delivery possible.

The first question asked by the owner is: "How's it comin', Doc?"

Often this is difficult to answer, for, unless there is a landmark, such as the nose, tail, ears or nostrils, all the legs may appear alike at first. We have never yet been able to reach in and immediately announce in a loud, confident tone of voice how it "wuz comin'" until we had palpated some familiar portion of the critter's anatomy, such as mentioned above.

After we have determined the position of the fetus, and what, if anything, is wrong. We figure out the best course to take to correct this and take plenty of time in these preliminary efforts, for we want to conserve our strength for the actual delivery. Working fast at the right time may prevent the fetus from suffocating. We prefer to bring one shoulder or one hip out at a time, thus avoiding a "wedge."

It may be stated again that the element of good luck plays a prominent part in the festivities. In some cases, where we anticipate a barrel of trouble from the first symptoms observed, delivery may be fairly easy.

In other cases that look like a "cinch," one may have to struggle for several hours. Let us illustrate this with four cases occurring during the past month or so.

In the first case we were called to see a big Shorthorn cow which had been trying to calve all morning. We arrived at the ranch just after dinner and when we made our preliminary examination we could feel four feet and one tail. We rested a few minutes, and then upon making another examination, found a head alongside the tail. We knew then that a pair of twins was causing the trouble, and we figured we were in for an afternoon of physical exercise. Luckily, the uterus was fairly large, and the cow stood up without flinching. Before we knew it, we had the head and fore feet of one calf up to the pelvic outlet, and, to our surprise, out it came with little effort. The other calf was soon brought out just as easily, but in a posterior presentation. We attribute this good fortune to the large size of the uterus, to the medium-sized calves, and to the fact the cow had a fine disposition, and really helped us, instead of hindering.

The second case was in a young Holstein heifer, which had been accidentally bred before she was a year old. We found the fetus with the head turned down and under, until its nose seemed to reach to the upper part of the cow's udder. The uterus was small, and the first thing the patient did was to throw herself down and strain with all her might. Luckily, we had her hind parts elevated and, after three hours of the hardest work imaginable, finally succeeded in raising the nose and both fore feet of the fetus up to the outlet, where it was delivered after some healthy pulling.

Early one Sabbath morning we were called to see a young Hereford heifer out in a wooden pasture. The calf was coming normally, but had been dead for some time. The owner had attached a rope to its feet, and had used all his manly strength in pulling, but to no avail. Both shoulders were wedged in the outlet, so we decided to repel them a few inches, which was finally done. We now attached one obstetrical chain to the lower foot, and had the owner raise the cow's upper hind leg, as we gave the calf a little traction. We finally got one shoulder out far enough so we could slip our curved pen knife along the brisket of the fetus, and take out the lungs. Then we slipped

This complication arose in a case where the owner had tried to deliver the calf. The entire uterus was out. It was replaced, and the cow recovered

the other shoulder out, removed the rest of the viscera, and, with some vigorous efforts, got the hips out. By this time the gluconate and dextrose were getting in their work, and the heifer soon got up and ate a few oats.

The fourth case was in a grade Shorthorn heifer, with a history of having been found in the pasture, bloated, straining, and very weak. We found a dead calf, with more placental fluid than we have seen in many a year. The head and both front feet were turned back.

Getting her tied to a tree, we gave her gluconate, some camphorated oil and a Reek's bovine capsule. We headed her down hill, for we knew she would take a "flop" as soon as we began our manipulations. We were not disappointed in this, for she did everything she possibly could to impede our efforts. Finally, we worked the head up to the pelvic outlet, and slipped a blunt hook in the eye socket of the fetus, holding it there while we pulled back the front legs to a proper position. After two hours of toil, we had the calf out. Our only assistant in this case was a 15-year-old boy, the son of one of our former students.

These are merely typical cases such as we find as we go along. In one week this summer we had ten difficult calvings, three of them in one day. As a rule, out of each ten calving cases, six will be easy to handle, two will be fairly difficult, one extremely difficult, and one hopeless or too far gone when found. This applies more to the summer season when young stock are out on pasture, and are not observed every day by the owner.

Hopeless Cases

In athletics one soon learns the importance of not trying to accomplish the impossible. In baseball, if a foul travels high over the bleachers, it is useless for a fielder to try to retrieve it. In bowling, when a "seven-ten split" occurs, one might as well forget all about it. In practice we have to do the same thing at frequent intervals. Instead of wearing ourself out trying to achieve the impossible, we inform the client of our findings. We tell him if he wants to get another veterinarian, or take the patient to the college clinic, that will be all right with us. We explain that we will charge him for a regular call for the trip and examination, the charge being from five to ten dollars, depending on the mileage. If we stay and work on the case, which, we add, we regard as absolutely hopeless, we will have to charge him double or triple the original expense. We also offer to put her out of her misery if he so desires.

In the great majority of such cases the owner nods his head, and, a few days after the patient is buried, the incident is almost forgotten. The reasonable fee has made a favorable impression on the owner, and he will call up again with full confidence.

The time to inform the client of this unfavorable prognosis is before one has run up a big bill. What the client wants is results. It is unfortunate that we are judged along this line. We have been given more credit for "curing" easy cases than in losing ones that we gave every ounce of our strength to save.

After Care

This is a mighty important element in handling obstetrical cases, and particularly in a weak and devitalized dairy cow which is a bright and shining mark for all kinds of fatal complications.

We like to have the fresh cow kept in a clean shed or box stall for a few days, and given plenty of balanced rations, warmed water and salt. It is better not to milk her out clean for several days.

Unless it is greatly infected, we do not remove the afterbirth at the time of delivery. When we do have to perform this operation, we use rubber gloves and an aromatic antiseptic. We do not inject the watery solution directly into the uterus, but merely into the vaginal passage. (Unless one does something like this, the owner is not satisfied, for he wants her "washed out.") We then insert several uterine capsules. In winter we often give orally a No. 10 capsule composed of 120 grains tartar emetic, 30 grains barium chloride, 1 grain lobelia and one-quarter grain strychnine. One may also give 5cc mixed infection bacterin. However, the gluconate seems to take care of the situation pretty well.

A Very Important Item

Let us mention a trivial little fact not commonly dealt with in scientific literature. We refer to the payment of the bill.

About 25 years ago we said pleasantly to a client who had his check book stripped for action:

"Don't bother about that now; wait and see how she comes out."

He took us at our word and never bothered again.

You see, we had been inseminated with the idea that our sole aim in life was to serve the public, and that they would bring our fees to us on a silver plate. In our innocence, we thought that they would be so grateful they would almost break a leg running down to our house before breakfast to pay a bill.

It was then and there we learned that the proper time to gracefully flip a check or a piece of Uncle Sam's green paper into our pocket was when the client's brain was in such a dizzy whirl he offered to pay. According to the sixth verse of the third chapter of Ecclesiastes there is "a time to get, and a time to lose."

And that, brother, means just what it says.

An Inexpensive Bacteriological Incubator

By C. S. BRYAN and L. F. JENNINGS
Michigan Agricultural Experiment Station
East Lansing, Michigan

THE veterinary practitioner has long felt the need for an efficient yet inexpensive 37° C. incubator. Such an incubator is essential in making microscopic tests for streptococcic mastitis, which entails the incubation of properly collected and handled milk samples at 37° C. for at least 12 hours, and in making standard plate bacteria counts, reduction tests, and other examinations that require incubation temperatures of 37° C. for specific periods of time. The purchase cost of the commercial incubators is too great, according to the average veterinary practitioner. This study was undertaken in an effort to build an inexpensive incubator that would maintain desired temperatures uniformly.

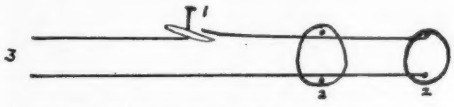


Diagram 1. The manner of wiring the incubator heat control apparatus

1 = Wafer thermostatic control
2 = Light bulbs
3 = Source of current

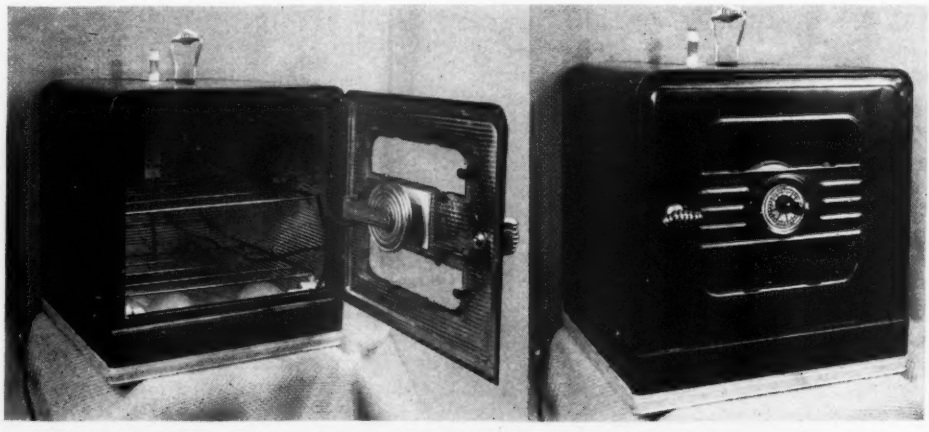
Materials Required

The following materials are needed for constructing the incubator:

1. One burner-type oven for kerosene stove.
2. Three pieces of celotex or other insulation cut to fit into the air space between the inner and outer shell of oven.
3. One chick brooder thermometer.
4. Two porcelain lamp bases.
5. One chick brooder thermostatic heat control (wafer type).
6. Six feet of rubberized electric wire.
7. One electrical plug-in connection.
8. One piece of plywood for base of incubator.
9. Two 25 watt electric bulbs.
10. Ten stove bolts. (Two 1½ inch bolts to anchor porcelain lamp bases; eight ¾ inch bolts to hold the outer shell celotex and inner shell in place and to anchor base.)
11. One can of white enamel.

The cost of these materials for making the incubator depends upon the local prices, but should not exceed $5.00.

* Presented at the Veterinary Post Graduate Short Course at Michigan State College, East Lansing, January 27-31, 1941. Journal Article No. 540 (N.S.) from the Michigan Agricultural Experiment Station.



Figs. 1 and 2. Two views of the bacteriological incubator, constructed as described in the text

Construction of Incubator

The spot-welding at each of the four corners of the base of the oven was broken, permitting removal of the inner shell. The celotex insulation was cut to size and inserted between the inner and outer shells of the two sides and top of the oven. No insulation was placed in the door or in the rear of the oven, since the oven had no air spaces at these points. The inner shell was replaced and anchored by bending the flanges at the bottom of the oven.

The plywood base was installed and anchored with two bolts at opposite ends of each side. One porcelain lamp base was then installed on each side of the incubator (Fig. 1) by holding through the outer shell, celotex, and inner shell.

Two small stove bolts were set about one inch apart in the top of the oven. A hole of sufficient size was drilled between these bolts to accommodate the thermometer (Figs. 1 and 2). The heat indicator in the door of the oven was replaced with the thermostatic control (Figs. 1 and 2), and wired according to Diagram 1.

Results of Efficiency Tests

The incubator was equipped with two 25 watt light bulbs as the source of heat. The tests were carried out in a routine procedure with the loaded and empty incubator under conditions of room temperature ranging from 1° C. (34° F.) to 39° C. (103° F.).

In all cases the temperature of 37° C. ± 2° was maintained when the room temperature was less than 37° C. Under conditions of room temperature above 37° C. the same temperatures prevailed within the incubator as within the room concerned. In each case upon opening the incubator for loading when the room temperature was less than 37° C. a drop of incubator temperature was noted. The extent of the drop was dependent on the number and temperature of the milk samples or other materials introduced. In all cases, under the most severe conditions of testing, the temperature of materials introduced into the incubator attained 37° C. within a period of three hours.

One of these incubators has been in continuous use for a period of six months, and there is every indication that it will continue to give good service for an indefinite period.

Summary

Plans are presented for the construction of an efficient, inexpensive bacteriological incubator. The thermostatic control permits the regulation of temperature within the incubator from any point slightly above room temperature to one more than 37° C. An inside temperature of 37° ± 2° C. can be maintained under room temperature conditions varying from 1° C. to 39° C. This incubator is particularly well adapted to the incubation of milk samples for the microscopic test for streptococcic mastitis, but it can be used for other purposes also.

* * * *

How to Have and How to Avoid Rabies

El Paso, Texas, in recent weeks experienced a moderate rabies outbreak which has received considerable newspaper publicity and occupied no little radio time. It started with three canine cases which occurred almost simultaneously. As a result of exposure or feared exposure, 50 persons were given the Pasteur treatment.

A month later rabies began to appear in other dogs, and further prophylactic treatment of persons was necessary. The publicity increased. The local veterinarians recommended compulsory vaccination and the health officers muzzling of all dogs.

Fort Bliss adjoins El Paso. It has a population approximately one-third that of the city, together with a large number of dogs which freely intermingle with the city dogs. There have been no cases of rabies nor any rabies scare on the military reservation. All dogs on the post and all dogs belonging to the numerous military personnel living in the city are required to be vaccinated every six months. The order is rigidly enforced. The experience of Fort Bliss affords a demonstration of what a city may do to achieve freedom from rabies when it wants such freedom.

Acetonemia in Cattle

Acetonemia (ketosis), according to Udall, is a noninfectious disease of well nourished, high-producing cows of all ages. It is characterized by marked hypoglycemia, acetonuria, and acetonemia, thought to be due to an impaired carbohydrate metabolism. This disease has been recognized in Europe for a long period but strangely was not described in this country until 1933. Since first described by Alston[1] the disease has been recognized wherever dairy cows are found in any considerable numbers. Its recognition has to a large extent cleared up one of the most puzzling problems in connection with milk fever—that of relapses after treatment.

The symptoms vary greatly, ranging from depressed consciousness and semi-coma to a greatly increased stimulation of all reflex and motor nerves. Other common symptoms are rapid emaciation, constipation, sudden cessation of milk production and marked anorexia.

Diagnosis is based on these clinical symptoms, confirmed by a positive reaction to a test for ketone bodies in the urine or milk.

Between June, 1940, and June, 1941, about 100 cases of ketosis were diagnosed and successfully treated in Greenwood County, Kansas. The cows affected were all bred for milk production, and the disease occurred during the lactation period. The time of onset varied from one to four days after parturition (when it usually occurred in combination with milk fever) up to eight months after parturition. It seems to occur most often in cows which have had two or three previous lactation periods.

Many apparent relapses of milk fever after treatment are in reality cases of ketosis. Such incidents may be avoided if both calcium and dextrose solutions are administered in treating milk fever.

Acetonemia may occur at any time, but more cases are observed during late summer when the cattle are on dry grass and the water supply is low, or in late winter when the cattle have long been on dry feed of poor quality.

[1] Alston, J. T., 1933. Palsy after calving. *Vet. Med.* 28:4, pp. 159-160.

A case encountered recently was that of a shorthorn cow on pasture, which after six weeks of her third lactation period suddenly went off feed. Her milk flow was greatly reduced and she was semicomatose, stiff and insensible. Her temperature was 101.1°F. She was given 500cc of 20% dextrose solution intravenously, and 1 oz. chloral hydrate and 1 lb. Epsom salt in two gallons of water by stomach tube. An ounce of chloral hydrate in solution was left to be administered the next day, and the addition of one pint of molasses to the feed twice daily for seven to ten days was also prescribed. This cow made a seemingly complete recovery, but again came down with the disease after about six weeks and had to be retreated.

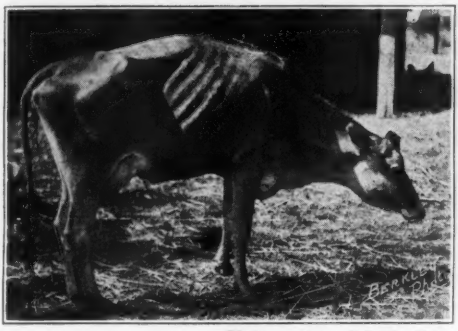


Photo courtesy of J. T. Alston

A CASE OF ACETONEMIA

Udall states that acetonemia is a disease of well-nourished cows, and New York experience substantiates this view; on the other hand, in the southeastern states where this ailment is as common as is milk fever, J. T. Alston, who has treated hundreds of cases, finds it chiefly in poorly nourished cows—rarely in cows at pasture. In Alston's experience chloral hydrate given orally is a specific for acetonemia, bringing about recovery usually within 24 hours and often in less time

A Jersey cow showing the same symptoms was given the same treatment but failed to respond. It was later established that she had lead poisoning from ingesting paint. Whether this case represented a fortuitous combination of the two conditions or whether the acetonemia resulted from the lead poisoning was not determined.

WILLIAM H. VANDERBILT

Eureka, Kans.

Bovine Hemoglobinuria

By
C. D. FOLSE
Kansas City, Missouri

AN APPARENTLY new disease of cattle, characterized by the constant symptom of hemoglobin in the urine, has appeared in various parts of Texas and Oklahoma. It usually affects calves four to six months of age, but has been observed in cattle up to seven years of age. Cattle on the range and those in housed herds have both been affected. As a rule, only one or two cases occur in a herd, although in one herd of pure-bred Jerseys several cases occurred in one barn.

Dr. T. T. Christian, Waco, Texas, reports cases of the disease in a number of herds near Waco, all in calves four to six months of age. The disease has appeared in herds of dairy cattle being prepared for show purposes, in herds on the range, and in small farm herds.

Dr. L. G. Cloud, Assistant State Veterinarian, Fort Worth, Texas, has found the disease in both young and old cattle. He has investigated outbreaks at Waco, Fort Worth, and in the vicinity of Amarillo, Texas. Quite recently Dr. Cloud has had reports of this disease around Corpus Christi, in the southern part of the state along the gulf coast.

Dr. Hubert Schmidt, director of the experiment station at College Station, Texas, states that he has been unable to find any reference to the disease in the literature. He has conducted several experiments with it, but no etiologic factor has been discovered as yet. No facts have been ascertained as to the means of transmission; attempts to transmit infection by inoculating healthy animals with the blood of affected ones have failed to date.

Pathogenesis

In the cases observed by Doctor Christian, affected calves sometimes did and sometimes did not go off feed. Usually the first evidence of an attack is bloody urine, accompanied by an elevation of temperature, up to 103°F. and even to 107°F., an anemia characterized by marked decrease of red blood cells, and a rapid pulse. Death follows in 24 to 48 hours unless the animal is treated promptly. On post-mortem examination, marked anemia is evident, and the bladder is engorged with urine colored with hemoglobin. In many cases the stomachs contain quantities of dirt of an offensive odor.

Doctor Cloud states that treatment has been largely unsuccessful in the cases he has observed. Doctor Christian states that he has had remarkably satisfactory results in the cases he has handled. He gives 100 to 150cc of hydrochloric acid solution intravenously until the urine clears. The hydrochloric acid is intended to restore normal functioning of the blood-forming organs. At the same time, 10cc of rabies vaccine is injected subcutaneously for its hemostatic effect. If the animal is weak, 500cc of fresh citrated blood is injected daily as needed. If the temperature is above 103°F., 52.5gr of sulfapyridine is administered *per os* and repeated in two to four hours. Of all the cases treated in this manner, only one failed to make a prompt recovery; in that case normal bovine serum was used instead of whole blood.

Case Records

The following cases are reported from the experience of Doctor Christian:

Case No. 1.—A registered Jersey heifer, six months of age, was noticed by the owner to be voiding bloody urine. He loaded the calf into a truck and drove to Doctor Christian's hospital. During the trip the calf went down and could not rise. The temperature was 103°F. One hundred cc of hydrochloric acid solution, 1 to 1500, was injected intravenously, 10cc of rabies vaccine subcutaneously, and 250cc of fresh citrated blood intravenously. After six hours, an additional 500cc of citrated

blood was given. The next day the calf was able to rise. Again 500cc of citrated blood, 10cc of rabies vaccine, and 100cc of hydrochloric acid solution were injected, and the following day, 100cc of hydrochloric acid solution and 10cc of the vaccine were given. This cleared up the urine. The calf was in show condition four weeks after treatment.

Case No. 2.—A five-month-old registered Jersey heifer passed bloody urine and had a temperature of 107°F. It continued to eat throughout the illness and treatment. This calf received an injection of 100cc of hydrochloric acid solution and 10cc of rabies vaccine, with oral administration of 52.5gr of sulfapyridine, the dose of sulfapyridine being repeated four hours later. The next day, with the temperature reduced to 102.8°F., the same doses of hydrochloric acid solution and rabies vaccine were given, clearing up the urine completely. This calf was not given any citrated blood. In four weeks it was again normal.

Case No. 3.—A registered Jersey bull calf had a good appetite but was voiding bloody urine and had a temperature of 106°F. The same treatment was administered as in Case No. 2, and on the second day the urine cleared up.

Summary

A bovine disease of unknown origin, with a syndrome not previously described in veterinary literature, has made its appearance in Texas and Oklahoma. The characteristic symptoms are hemoglobin in the urine, elevated temperature, and anemia due to the destruction of red blood cells. The etiologic factor or factors and the method of transmission have not been determined. Injections of hydrochloric acid solution and rabies vaccine appear to be curative, and blood transfusions are supportive in weak animals, while sulfapyridine is effective in controlling excessive elevations of temperature.

Anthrax in Texas

According to Dr. L. G. Cloud, assistant State Veterinarian of Texas, "Very extensive outbreaks of anthrax in virulent form have occurred in communities where heretofore there has been none, such as central east Texas and around Lubbuck and Huntsville and other new territory. These infections have undoubtedly been brought in by uncontrolled community sales."

Urticarial Form of Swine Erysipelas

Approximately half of the ears of the front two pigs shown in the illustration had sloughed away. There was extensive sloughing of the skin in all three. This may be noted in the illustration, on the back and ham of the animal in front, all along the back of the middle one and on the shoulder and flank of the one in the background. A definite diagnosis of swine erysipelas was established.

A swelling and curling of the ears, accompanied by a noticeable "slowing up," was the first symptom in this outbreak. Later patches of inflammation appeared in the skin on various parts of the body. The loss of one foreleg below the elbow as well as sloughing of both ears and a great section of skin along the back was observed in one pig about four months of age.

Of this type of swine erysipelas, Dr. T. W. Munce,[1] of Sioux City, Iowa, recently said:

"The urticarial form of swine erysipelas, or 'diamond skin disease,' is usually a mild form of the disease. Generally speaking, it is of slight economic importance, although some cases terminate in complications which result fatally or reduce the value of the affected animal. Some observers report that in animals suffering from diamond skin disease, the infection sometimes becomes septicemic. If that is true, they may constitute a source of danger as spreaders of the more serious forms of swine erysipelas."

[1] At the annual meeting of the Indiana Veterinary Medical Association, Indianapolis, Jan. 14-16, 1941.

Suggestive Evidence of Trace Element Deficiency in Illinois Sheep*

By WILSON L. WRIGHT

Department of Animal Pathology and Hygiene
University of Illinois, Urbana, Illinois

A DEFICIENCY disease of sheep due to lack of cobalt in the soil is known to exist in other countries. It has been described under the names, bush sickness and Morton Mains ailment in New Zealand (Askew,[1] Askew and Dixon,[2, 3] Bell,[4] McNaught,[5] Hopkirk,[6] Hopkirk and Greminett,[7] and Dixon[8]). The names coast disease, enzootic marasmus, enzootic ataxia, and wasting disease are used in Australia (Marston, Thomas, Murnane, Lines, McDonald, Moore and Bull,[9] Filmer and Underwood,[10] Marston, Lines, Thomas and McDonald,[11] and Harvey[12]). In Scotland the condition is known as "pine" (Corner and Smith[13]). In the United States, Neal and Ahmann[14] have shown that the condition which occurs in Florida under the name "salt sickness" can be prevented by the use of cobalt. A subnormal amount of cobalt in the forage may occur when the soil is deficient or when it is too alkaline. Apparently plants are unable to utilize cobalt in the soil unless it is somewhat acid.

In the fall of 1940 a condition was encountered in the University of Illinois flock which in general resembled that caused by cobalt deficiency in Australia and New Zealand. All the lambs in the flock had been thrifty during the summer, and had very few parasites. In the latter part of September, however, about 30 animals began to lose condition for no apparent reason. The clinical picture was one of general rundown condition, emaciation, weakness, and anemia. About 10 of the lambs died before January 1, 1941. At autopsy the principal lesions found were fatty infiltration of the liver, and low blood hemoglobin.

The affected lambs were removed from the flock, penned separately, and fed what was considered an adequate diet together with tonic capsules and yeast tablets, but no improvement was obtained.

The possibility of a trace element deficiency was then suggested by Professor W. G. Kammlade of the Animal Husbandry Department. Accordingly, on February 13, 1941, the lambs were separated into two groups. Nine lambs, ranging in condition from very poor to fair, were given the standard ration fed at the sheep division plus a mixture of powdered salts containing iron, copper, magnesium, manganese and cobalt. At the start of the experiment, the average weight of these lambs was 48 pounds, and the average blood hemoglobin (Newcomer method) of eight of them was approximately 7.3gm per 100cc. A little later, seven more lambs, averaging 58 pounds in weight, were added to this group. A second group of four similar lambs was fed the basal diet alone as a control. The average weight of these lambs at the start of the experiment was 55 pounds.

Weights and blood hemoglobin levels were

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* An abstract of a research report prepared under the direction of the Division of Animal Pathology and Hygiene in partial fulfillment of the requirements for the M. S. degree in Animal Husbandry. The author is indebted to Drs. Robert Graham, J. Sampson, N. D. Levine and L. E. Boley for suggestions and criticisms.

[1] Askew, H. O., 1938. The value of cobalt supplements for breeding ewes at Sherry River, Nelson. *New Zeal. Jnl. Sci. Tech.* 20A, pp. 192-196.

[2] Askew, H. O. and J. K. Dixon, 1937. The value of cobalt salts for pasture top-dressing in the treatment of stock ailment at Glenhope, Nelson, and Morton Mains, Southland. *New Zeal. Jnl. Sci. Tech.* 19, pp. 317-325.

[3] Askew, H. O. and J. K. Dixon, 1937. Cobalt status of animal organs from South Island (N. Z.) drench experiments. *New Zeal. Jnl. Sci. Tech.* 18, pp. 707-716.

[4] Bell, M. E., 1937. Some physiological aspects of the cobalt problem. *New Zeal. Jnl. Sci. Tech.* 18, pp. 716-719.

[5] McNaught, K. J., 1938. The cobalt content of North Island pastures. *New Zeal. Jnl. Sci. Tech.* 20A, pp. 14-30.

[6] Hopkirk, C. S. M., 1937. Cobalt-feeding experiment at Arohena. *New Zeal. Jnl. Agric.* 54, pp. 344-349.

[7] Hopkirk, C. S. M. and R. E. R. Greminett, 1938. Importance of cobalt. Relationship to the health of farm animals. *New Zeal. Jnl. Agric.* 56, pp. 21-24.

[8] Dixon, J. K., 1937. The use of a cobaltized salt lick in the control of a lamb ailment at Morton Mains, Southland. *New Zeal. Jnl. Sci. Tech.* 18, 892-897.

[9] Marston, H. R., R. G. Thomas, D. Murnane, E. W. Lines, I. W. McDonald, H. O. Moore and L. B. Bull, 1938. Studies on coast disease of sheep in South Australia. *Commonwealth Austral. Counc. Sci. Indust. Res. Bull. No.* 113.

[10] Filmer, J. F. and E. J. Underwood, 1937. Enzootic marasmus. Further data concerning the potency of cobalt as a curative and prophylactic agent. *Austral. Vet. Jnl.* 13, pp. 57-64.

[11] Marston, H. R., E. W. Lines, R. G. Thomas and I. W. McDonald, 1938. Cobalt and copper in ruminant nutrition. *Nature* 141, pp. 398-400.

[12] Harvey, R. J., 1937. The Denmark wasting disease. Cobalt status of some West Australian soils. *Jn. Dept. Agric. W. Austral.* 14, pp. 386-393.

[13] Corner, H. H. and A. M. Smith, 1938. The influence of cobalt on pine disease in sheep. *Biochem. Jnl.* 32, pp. 1800-1805.

[14] Neal, W. M. and C. F. Ahmann, 1937. The essentiality of cobalt in bovine nutrition. *Jnl. Dairy. Sci.* 20, pp. 741-753.

determined weekly until April 14th, at which time the lambs which had been receiving the mineral mixture were in good enough condition to market. The nine lambs with which the experiment was started averaged 74.4 pounds on April 10th, an average daily gain for the eight weeks of 0.47 pounds. The other seven lambs in this group averaged 78.5 pounds after 41 days, having made an average gain of 0.50 pounds a day. However, the blood hemoglobins of eight of the treated lambs had increased to an average of approximately 8.0gm per 100cc, an increase of only 0.7gm over the pretreatment level.

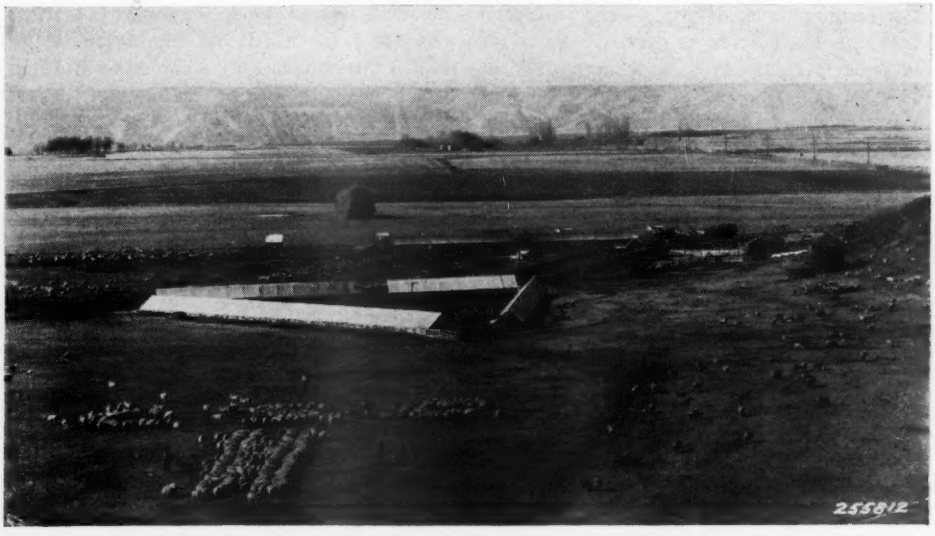
One of the untreated control lambs died on March 6th. The other three lambs weighed an average of 62 pounds 41 days after the start of the experiment, an average daily gain of 0.15 pounds.

While these results must be regarded as preliminary, the evidence indicates that feeding of the mineral mixture did result in a marked improvement in the condition of affected lambs as compared to that of control animals. Since several elements were fed, the one or ones which were responsible for the improvement cannot be designated. The similarity of the symptoms to those described for cobalt deficiency in other countries suggests, however, that a cobalt deficiency may have been present in these lambs. Further study is necessary to determine whether such a deficiency actually exists in the midwest, and this note is intended merely to call attention to the possibility.

A deficiency disease of sheep due to lack of cobalt in the soil, called variously "bush sickness," "wasting disease," "pine," etc., has appeared in Australia and elsewhere. A condition with the same general symptoms, occurring in an Illinois flock, was the subject of the investigation reported here.

Summary

A condition in lambs characterized by emaciation, anemia and weakness and in which improvement followed the feeding of a mineral mixture containing iron, copper, magnesium, manganese and cobalt is described in an Illinois flock. The possibility that a trace mineral deficiency may exist in some Illinois soils is suggested by this observation.

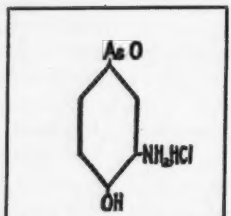


Lambing sheds on a Western ranch

Mapharsen Therapy in Enterohepatitis of Turkeys*

By ERNEST C. McCULLOCH and LYLE G. NICHOLSON
State College of Washington, Pullman, Washington

MAPHARSEN (Meta-amino-para-hydroxy-phenylarsine-oxide hydrochloride) previously has been reported efficacious in the treatment of enterohepatitis in turkeys by Blount[1] and by Bolin and Vardiman.[2]



Structural Formula of Mapharsen

This drug, which contains 29% arsenic in trivalent form, is not an entirely new preparation. Ehrlich early recognized the spirocheticidal effect of arsenoxide, but discarded it because of its great toxicity. Its simplified and highly purified derivative, now sold under the trade name "Mapharsen," is being widely used in human medicine in the chemotherapy of syphilis. When the massive-dose intravenous technic is employed, the usual dose is 0.24gm per day for five days. Weekly doses of 0.04gm for women weighing 100 pounds or over and 0.06gm for men weighing 150 pounds or over are given for 10-week periods. This is a maximum of 0.000882 Gm/Kilo, although the directions state: "The effective weekly dose of Mapharsen has been determined to be one milligram per kilo of body weight." The recommended dose for infants and children is 0.5 milligram per kilo, with a maximum of one milligram per kilo of body weight.

The injection of solutions of this drug has been reported to be almost without hazard, although Rangiah[3] called attention to two deaths following mapharsen therapy.

Blount,[1] who used mapharside (said to be identical with mapharsen, although a slightly different structural formula is given in his paper), recommended 0.004gm as the therapeutic dose for a three-month-old poult and 0.006gm for a five-month-old poult. Bolin and Vardiman,[2] who used mapharsen, administered 0.006gm.

Experimental

Last year approximately 1500 turkeys had been reared on ten acres of ground, with an estimated loss of 200 from blackhead. This year turkey raising again was attempted on this highly-contaminated ground. Although attempts were made to maintain a concentration of phenothiazine in the feed sufficiently high to kill any newly-hatched cecal worms, blackhead developed at the age of eight weeks. Post-mortem lesions were suggestive of those described by Allen[4] as characteristic of mixed infections of trichomoniasis and histomoniasis. "Lesions in the livers of turkeys having natural mixed infections of *T. gallinarum* and *H. meleagridis* are relatively large, circular, markedly depressed areas, with slightly raised granular borders and sometimes with granular centers."

At the height of the epizootic, 27 turkey poults weighing from eight to 12 pounds and showing clinical evidence of blackhead were given 0.005gm mapharsen. The material was prepared by dissolving the contents of one 0.06gm ampoule in 12cc of boiled water, and one cc of the solution was injected into the pectoral muscles. Of the 27 birds treated,

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[1] Blount, W. P., 1938. New arsenical preparations in the treatment of blackhead in turkeys. *Vet. Jnl.* 94, pp. 344-347.

[2] Bolin, F. M. and P. H. Vardiman, 1941. Mapharsen as a treatment for enterohepatitis of turkeys. *J. A. V. M. A.* 98, pp. 223-231.

[3] Rangiah, P. N., 1940. Deaths following mapharsen therapy, *J. A. M. A.* 115, p. 319.

[4] Allen, Ena A., 1941. Macroscopic differentiation of lesions of histomoniasis and trichomoniasis in turkeys, *Am. Jnl. Vet. Res.* 2, pp. 214-217.

17, or approximately 63%, made complete clinical recoveries and were returned to the flock. While these birds were retarded during their period of illness, they gained at a normal rate after recovery. None of the birds which recovered received more than one treatment. Four birds which did not respond to the first treatment were given a second treatment. All of these died, although Blount reported giving 0.004gm per bird on September 16, and repeating this dose on September 24, October 8 and November 8, with eventual recovery. Three successive birds which were given mapharsen solution that had remained in the household refrigerator for more than three days, died.

Table I.—Toxicity of Mapharsen

Chicken Number	Weight 7/22 (grams)	Weight at Treatment (grams)	0.6% Mapharsen Solution	Mapharsen (grams)	Gm/Kilo	Result	Weight 8/2 (grams)	Gain 7/22-8/2 (grams)
201	1260	1265	1cc (fresh)	0.006	0.00474	No reaction	1565	305
242	1080	1115	2cc (fresh)	0.012	0.01076	No reaction	1365	285
224	1220	1240	3cc (fresh)	0.018	0.0145	Transitory dyspnea, weakness	1335	115
260	1120	1150	4cc (fresh)	0.024	0.0208	Died between 10th and 17th hour		
261	1330	1410	2cc (96 hours old)	0.012	0.0085	No reaction	1615	285
275	1210	1260	3cc (96 hours old)	0.018	0.0143	Transitory dyspnea, weakness	1460	250
Average of 18 controls	1203						1469	266

One of the treated birds which clinically recovered was later sacrificed. The lymphomatous-like tumors, which Blount[5] has noted as being present after the healing of enterohepatitis lesions, were present in the liver. Blount reported, "Flocks of turkeys affected with blackhead had been inoculated with a new arsenical spirocheticide (mapharside, P. D. & Co.), and when odd birds died these were examined to confirm the histomonas infestations. After a while, instead of finding the typical blackhead ulcers, lymphomatous 'tumors' of the liver were found. These appeared to be associated with the healing of blackhead lesions. Oval or irregular, pale, rather soft tumors were found scattered throughout the liver, whilst in addition a smaller number of typical blackhead ulcers were present. Five or six such cases occurred, and histological examination kindly carried out by Dr. C. L. Oakley, Wellcome Physiological Research Laboratories, Beckenham, Kent, revealed 'fairly typical blackhead lesions, with numerous amebae, but showing a good deal of rather active lymphoid infiltration . . .'"

Toxicity of Mapharsen

Toxicity experiments were made on four-month-old Rhode Island Red cockerels, and the results are shown in Table I. The intramuscular injection of solutions containing 0.006 to 0.012gm of mapharsen into birds weighing from 1115 to 1410gm, which is at the rate of from 0.00474 to 0.01076 Gm/Kilo, was without apparent deleterious effect, either in producing symptoms or upon subsequent rate of gain. The injection of 0.018gm of mapharsen into birds weighing approximately 1210gm, or at the rate of approximately 0.0143 Gm/Kilo, produced severe dyspnea and weakness, which was first noticed within five minutes and was most pronounced 15 to 25 minutes after the injection of the solution. These birds recovered, however, although one failed to make normal gains. The bird which weighed 1120gm and was given 0.024gm mapharsen, or at the rate of 0.0208 Gm/Kilo, died between the 10th and 17th hour.

It is interesting to note that even in the massive-dose technic, in which the usual dose is 0.24gm over a period of 24 hours, a man weighing 160 pounds would receive but

[5] Blount, W. P., 1938. Clinical notes on poultry diseases. *Vet. Jnl.* 94, pp. 278-282.

0.004 Gm/Kilo, or less than one-half the rate which produced no symptoms in chickens and less than one-third the rate which caused transitory dyspnea and weakness, followed by recovery.

Mapharsen solutions which had been kept in the refrigerator (at approximately 40° F.) for 96 hours appeared to be no more toxic than were freshly prepared solutions. Blount warns that solutions not used immediately should be discarded, although he describes mapharsen as a relatively stable, homogeneous compound which does not become toxic while standing in solution. The directions which accompany the ampoules of mapharsen state, "Mapharsen solutions do not become more toxic on standing in the air."

Mapharsen is marketed in sealed ampoules containing 0.04, 0.06, 0.4 and 0.6gm, which retail at 65c, 75c, $1.05, and $1.45, respectively. The cost of each 0.005gm dose would therefore vary from slightly over 8c when the smallest ampoule was used to less than 1¼c when the largest ampoule could be used.

Discussion

Mapharsen therapy for enterohepatitis of turkeys is safe and economical, and the data presented thus far indicate that it will save at least half of the birds, provided adequate treatment is given within a reasonable time after clinical symptoms appear. Since it is known that approximately half of the liver function is impaired in enterohepatitis before clinical symptoms can be detected, and since the administration of therapeutic doses of this drug has no deleterious effect upon subsequent growth, it is suggested that all exposed birds be treated with light doses of mapharsen as soon as a diagnosis of blackhead has been established in the flock. It is possible that the dose of mapharsen can be reduced below 0.004 to 0.006gm per bird, especially in those cases where clinical blackhead has not appeared in the majority of the birds in a flock and repeated prophylactic doses may be indicated. These dosages would be proportional to the recommended dosages for humans if given to birds weighing between 10 and 15 pounds.

Shock Therapy

Shock is a peril met in surgical practice in severe infections, severe anemias, burns, acute coronary and pulmonary artery lesions, cholera, the dysenteries, etc.

J. C. Meakins[1] emphasizes that the beginning and progression of shock is best detected by frequent and accurate estimations of hemoglobin or by the hematocrit.

A rising hemoglobin percentage or an increase of cells to plasma ratio indicates hemoconcentration caused by loss of plasma through the capillary walls. This is probably the earliest indication of shock. Hemorrhage may blur this picture somewhat.

Fall in blood pressure, according to Meakins, is a relatively late indication of shock and ought not to be awaited to institute treatment.

If deficiency of the adrenal cortex is accepted as the fundamental cause of shock, substitution therapy as a prophylactic and cure for shock would be indicated. The point to strike at would be prevention of increased cellular permeability and maintenance of the water-balance between the intra- and extra-vascular systems.

Dehydration may be prevented or removed by saline infusions before operation or when the very early signs of shock become evident. Transfusions of whole blood and saline infusions are also indicated, but they have a transient value after shock has developed, since much of the fluid replaced in this manner is immediately lost to the vascular system. Transfusion, however, is particularly indicated in shock associated with hemorrhage.

Administration of a patent adrenal cortex extract would seem to strike at the root of the disorder by correcting the abnormal capillary and cellular permeability. Synthetic desoxycorticosterone is at best of only partial value in this respect.

Transfusion with concentrated blood serum might help to restore osmotic equilibrium of the blood which is reduced by loss of colloids to the extra-vascular spaces in shock. Concentrated serum might draw back some of the lost fluid into the circulation.—*Therapeutic Notes.*

[1] *Canad. M. A. J.* 43, p. 201, 1940.

Necrotic Laryngitis in a Calf

April 5, 1941, a month-old Hereford calf having great difficulty in breathing was presented for treatment. The dyspnea was so great that any struggling by the calf caused it to choke. The mucous membranes were cyanotic and the temperature was 105°F.

With the aid of a laryngoscope a diagnosis of necrotic laryngitis was made. On either side of the larynx were necrotic areas about one-half inch in diameter, and the surrounding areas were so swollen that only a very small passage was left for air. A guarded prognosis was made.

The treatment consisted of local application of potassium permanganate solution on the necrotic areas and the administration per os of 130gr of sulfapyridine, divided into four doses, daily for two days, after which 75gr per day was given.

Improvement in the animal was apparent after 130gr of sulfapyridine had been administered. The temperature dropped to 102°F. and remained there until the animal was released from the hospital. The dyspnea was reduced, the mucous membranes were normal in color, and the calf was able to suckle again.

The following day the calf was able to breathe normally when at rest, having difficulty only when handled. It also attempted to bawl. Examination of the larynx showed the swelling to be almost gone and the necrotic areas smaller.

Each day the calf's bawl became more audible and the breathing easier. After four days of treatment the calf was sent home, the owner being instructed to continue the reduced dose of sulfapyridine (75gr) another day.

Four days later the calf died after exposure to a rain storm.

From the results obtained in this case and in those noted by Farquharson, sulfapyridine seems indicated in cases of necrotic laryngitis. Due to the cost of this drug, however, such treatment is warranted only in animals of more than average value.

Care must be exercised in the use of sulfapyridine. Farquharson[1] recommends that the initial dose should be at the rate of 1gr per pound of body weight. This dosage should be reduced to approximately one-half for a few days before administration of the drug is discontinued, since a relapse is apt to occur if the drug is discontinued abruptly.

RAYMOND W. STANZEL

Wichita, Kans.

[1] Farquharson, James, 1940. Sulfapyridine in the treatment of calf diphtheria.—*J.A.V.M.A.* 97:764, pp. 431-436.

Possible Inherited Sterility

A series of early abortions, between the second and the fourth months of pregnancy, was reported in a mixed herd comprising 10 grade and purebred Jersey cows and a three-year-old Jersey bull at Winfield, Kans. Three heifers were affected, while the seven older cows in the herd were not. All the cattle were negative in reaction to the agglutination test for Bang's disease. The three affected heifers had been bred at 12 to 14 months of age for their first pregnancies, and conceived readily. One of the heifers had had one abortion, and the others two abortions, No. 1 having lost one calf in April, 1940; No. 2 one in July and one in December; and No. 3 one in April and one in December.

The bull used for breeding was purchased in the fall of 1939. He has been used only with this herd. So far as known, there was no relationship to these heifers. No cattle had been taken away from or brought to the farm in the last two years.

Heifers Nos. 2 and 3 are twins. Both were bred again in April, 1941. Heifer No. 1 was bred in the fall of 1940 and is at the time of writing in the seventh or eighth month of an apparently normal pregnancy.

While the cause of these abortions cannot be exactly determined, the presence of a genetic factor should be considered.

Twin heifer calves often prove sterile or uneconomical breeders. Often they have retained afterbirths, abortions, dystocia, or monsters.[1]

There has been only one case on record of a heifer, one of triplets or of a larger number at a single birth, that has been fertile. This exceptional case was reported by Dr. D. O. Bixby, Brasher Falls, N. Y. The animal was a grade Guernsey cow eight years of age, and was one of a group of quintuplets, the

[1] Williams, W. L., 1934. A clinical study of bovine twins and freemartins. *Cor. Vet.* 24:2, p. 123.

other four having been expelled dead or nonviable. She gave birth to viable female twins in her first pregnancy. Her other pregnancies ended in abortions and nonviable fetuses, including the abortion of quintuplets (two male and three neuters) in her fifth pregnancy.[2] According to Williams, "approximately half of bovine twins are aborted or born nonviable, so little opportunity is offered for testing their fertility."

It is hard to convince owners that it is not practical to keep twins, or cows that have had twins, for breeding purposes. When complete records have been kept on cows that have had twins, it is found that such cows are below normal in every way; their milk production is less, the number of progeny is smaller, and there is more reproductive trouble than normally encountered.

In short, in a uniparous animal the bearing of twins indicates an abnormality of some sort, and when the twins are kept for breeding purposes, trouble often results.

ROBERT H. CLARK.

Manhattan, Kans.

Bulldog Calf

A "bulldog" calf from a two-year-old, Jersey-Holstein cross which had been carried full term was brought to me on April 26, 1941. The calf weighed about 35 pounds and there was marked hydrocephalus, a cleft palate, an umbilical hernia, and the limbs were very rudimentary; being only about four inches in length. Sire and dam of this calf were half-brother and sister.

There was no history of any monstrosity in the herd previous to this one, except an hermaphrodite with male characteristics predominating born in the fall of 1939.

A condition similar to the above is described by Crew[1] as occurring commonly in the Dexter breed, which is one of the smallest breeds, the maximum weight of bulls being only 900 and of cows 800 pounds. The Dexter is characterized by a short, broad head and especially short legs. There is much uncertainty about its origin although it is generally believed to be an off-shoot from the Kerry with some crossing with the red Devon. In the early history of breeds there were four distinct types listed, black Dexter, red Dexter, black

The "bulldog" calf

Kerry, and red Kerry, however, breeding has been confined more and more to the black Dexter type. As this type of selection continued a high percentage of deformed and stillborn calves were produced.

According to Crew[1] "The abnormalities which these stillborn calves exhibit are constant and are so characteristic that the fetus is known as a 'bulldog' calf; the cranium is bulging, the nose markedly depressed, the lower jaw protruding, the upper lip is split (baring the teeth) while the swollen tongue thrust far out curls up over the nose. Owing to the disproportionate development of the buttocks, the tail seems to have its origin far up on the back, and usually there is a gaping deficiency of the abdominal wall through which the intestines escape to form a large umbilical hernia. The skin hangs loose in folds and there is abundant subcutaneous fat while the limbs are ridiculously short and the digits usually separated."

When this monstrosity occurs in Dexter herds, the incidence varies from 5 to 30%. Associated with this type of pregnancy are fetal anasarca, dropsy of the amnion, dystocia and retained placenta.

This condition is regarded as being endocrine in nature, possibly due to malfunction of the pituitary. It is thought to be hereditary. As may be noted in the accompanying photograph, the calf was partially devoured by dogs before I saw it.

J. L. KARNES

Benton, Kentucky

[2] Williams, W. L., 1936. Multiple pregnancies in cattle. *Cor. Vet.* 26:3, p. 208.

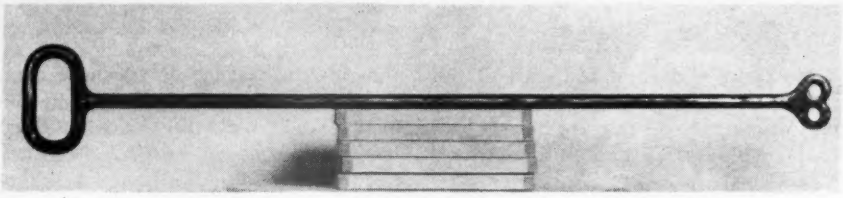
[1] Crew, A. E., The significance of an achondroplasis-like condition met with in cattle. Proceedings of the Royal Society of London, 1923, Series B.

A Handy Instrument for Use in Partial Torsion of the Uterus

Torsion of the uterus, though seldom encountered, is often troublesome when it does occur. In the case of a complete torsion, casting the animal and rolling it in the opposite direction to that of the twist is about the only method of treatment. The rolling sometimes causes the uterus to unwind and makes delivery possible.

Partial torsions occur more often than complete ones. I have found an instrument devised by Doctor Wastrack of Cedarsburg, Wis., useful in handling such cases. The instrument, a "rotator," will work on any torsion in which it is possible to get one hand into the uterus. This rotator is made of a ⅝ inch steel rod 34 inches long. One end is forged into a four-inch handle similar to that of a shovel. The other end is flattened out into a wing two inches wide, so that a ⅝ inch hole can be drilled in each side of the wing, about ½ inch apart.

Technic.—Assuming that the fetus is presented in the normal manner with the forelegs forward where they can be reached, a four-foot length of rope is tied to each foreleg. The two ropes are then run through the holes in the wing end of the rotator, one in each direction, and, the ropes being held fairly taut, the instrument is slid along them until the wing end touches the legs of the fetus. The free ends of the two ropes are then tied through the handle. The handle is turned in the direction opposite to the twist in the uterus, thus winding the rope around the rotator and exerting increasing turning force upon the fetus. A number of turns is required. It may even be necessary to attach a twitch handle to the handle of the rotator in order to get enough leverage to turn the fetus over. Once the torsion is straightened out, fluids flow from the uterus, and upon examination everything is found ready for a normal delivery.



The rotator used by Doctor Bayles (about one-sixth actual size

My rotator was made when I was a senior student, and it brought forth smiles from more than one faculty member. I carried it as a twitch for horses for three years before I came across a case of partial torsion to try it on. I was called about midnight to see a large Holstein cow after a neighbor who had examined her had declared, "I ain't never seen nuthin' like that in a cow," and advised that "a regular vetinary" be called. On arrival I found a torsion which left just room enough to squeeze one hand into the uterus. I inquired if anyone had felt for the calf; there were strong denials. I told them that the patient had torsion of the uterus and that it was a rare condition and difficult to handle. (The neighbor was pleased at this confirmation of his judgment.)

I got my ropes and rotator and went to work. The uterus was soon straightened and the calf delivered. Money could not have bought my rotator that night. My only regret was that none of my former instructors were there to see this demonstration of the instrument they had smiled at.

The next morning the cow was straining severely. Three hog-rings were placed at intervals on each side of the vulva and the cow laced up with bandage to prevent a possible prolapse of the uterus. The straining soon subsided and an uneventful recovery was made.

G. W. Bayles.

Marion, Ill.

Evaluation of Sulfaguanidine in the Treatment of Canine Coccidiosis

In order to test the efficacy of sulfaguanidine against coccidiosis in dogs, an experiment was planned using 22 naturally-infected puppies in six litters, five cocker spaniel and one bloodhound, all quite uniform in each litter. The puppies ranged in age from 29 to 50 days at the start of the experiment. Past experience has shown that puppies which are still nursing have a better chance for survival than do those which have just been weaned.

The puppies and their mothers were kept on wire-bottom pens, and the wire was brushed every day wherever any semblance of excrement had clung to it. The bedding in the hutches connected with the pens was changed twice each week. Reinfection was therefore minimized.

The puppies were fed twice each day a ration of commercial dry dog food with 25% melted beef fat added and moistened with evaporated milk and water. The average gain in weight during the ten days of the experiment was 1 1/3 pounds.

The test started June 22, 1941, and ended July 2. From June 24 to July 1 sulfaguanidine* was administered three times daily, in doses of approximately one grain per pound of body weight daily. (The doses could not be figured exactly because of daily variations in weight, depending upon such factors as mealtime, appetite, etc.)

Careful fecal examinations for coccidia oocysts were made at the start and several times during, as well as at the conclusion of the study. Roundworm and hookworm infestations also were recorded when present. Table I shows the results of the fecal examinations at the beginning and at the end of the experiment.

A weakness of many studies of drug action in coccidiosis is failure to maintain a sufficient number of controls. When this is the case, the fact that coccidiosis is a self-limiting disease may lead to mistaken conclusions; the drug is given, the dogs recover,

and, in the absence of adequate controls, the drug receives credit not really due it. In this study, a control was maintained for each puppy dosed. Although without these controls, it might easily have been concluded that in some instances the sulfaguanidine was very beneficial, the complete records show that the variations in infestation were not due to the action of the drug. Some of the treated puppies became sicker; some of the untreated ones did too. Some of the treated improved; so did some of the untreated.

TABLE I.

Dog	Wt. in Lbs. start	Wt. in Lbs. end	Coccidiosis start	Coccidiosis end	Round-worms start	Round-worms end	Hook-worms start	Hook-worms end
F1	2¾	3¾	xxx	x	—	—	—	—
*F2	3¼	4½	x	—	x	x	xx	x
*F3	2¾	3¾	x	—	x	—	xx	xx
*F4	2	2¾	xxxx	x	—	—	—	—
F5	3¼	4	xx	x	xx	x	xx	xx
S1	2¾	3¾	xx	—	xxx	xxx	—	x
*S2	3	4¼	xx	xxx	x	x	—	—
*S3	2¾	3¾	x	—	—	—	—	x
S4	2½	3¼	x	xx	—	—	—	—
A1	2¾	4	xx	x	xx	xx	—	—
*A2	2¼	3	—	xxxx	—	xx	—	—
R1	2¾	3¾	x	xx	xxx	xx	—	—
*R2	2¾	4¼	xxx	xx	xxx	xx	—	—
R3	3¼	4¼	xxx	—	xxx	xx	—	x
*R4	5	6¼	—	xx	—	—	—	—
B1	3¾	5¼	xx	xx	x	xx	—	—
B2	3½	5¼	x	x	—	—	—	x
*B3	3	4	x	x	—	—	x	x
*T1	4¼	6¼	xxx	x	—	—	—	—
T2	5¼	7½	xx	xx	x	x	—	—
*T3	5¼	8¼	xx	—	—	x	—	—
T4	4¾	6¾	xx	—	—	x	—	—

*Received daily approximately 1 grain of sulfaguanidine per pound of body weight.

All the puppies eventually recovered. None seemed very badly affected by the disease; in fact, some did not show a single symptom of illness, the fecal examination alone establishing the diagnosis of coccidiosis.

Roundworms and hookworms were apparently in no way affected by the drug.

LEON F. AND GEORGE D. WHITNEY.
Orange, Conn.

*The authors are indebted to Dr. Crossley of the Calco Chemical Co. for furnishing the sulfaguanidine used in this study.

Canine Duodenal Ulcer

According to Hutyra, Marek and Manninger,[1] gastric ulcers in domestic animals are rarely of clinical importance; although they are often found in the abomasum of calves, they seldom occur in adult cattle or in dogs, swine, or horses. In one thousand post-mortem examinations on dogs, only five had one or more gastric ulcers, and in only three animals was a duodenal ulcer found.

In animals, peptic ulcers of the stomach and duodenum always appear to develop from acute ulcerative processes or from hemorrhagic erosions. These tissue defects may be due to any cause giving rise to local necrosis or defective nutrition of the mucous membrane, so that the damaged tissue is digested by the gastric juice, and the healing of the lesion is delayed by the continuance of the cause or causes.

Kirk[2] describes a few cases of canine duodenal ulcer as being caused by street accidents. Other causes may be fright or shock following traumatism; oral or intestinal sepsis; hyperacidity of the gastric juice; and extensive burns or other septic conditions. Markowitz states that total exclusion of bile from the intestine has been found to produce it.

MacCollum[3] draws attention to the violent contractions of the stomach that result from the operative interference with tumors which involve the basal part of the brain. Such contractions seem to cause hemorrhages and ulceration in the stomach, often with perforation and fatal results. This confirms the idea that gastric ulcers may be caused by a nervous disturbance.

Case Record

February 9, 1941, a five-year-old St. Bernard spayed bitch was presented for treatment with the following history: On the morning of February 7th, the dog was in apparently normal condition. The next day it was noticed that she lay in the yard nearly all day, but as she usually slept a great deal during the day, little was thought of this. However, the next morning she was found still lying in the same place, unable to get up.

It was ascertained that the dog was in the habit of eating refuse from garbage cans about the city.

Symptoms.—The dog was in a state of sopor. The general appearance resembled that of barbiturate poisoning, but the dog could be aroused with difficulty. Other symptoms included a slow, weak pulse; temperature 99° F.; respiration down to eight per minute; congested mucous membranes; dilated pupils; low blood pressure; and cold extremities. When a stomach tube was passed the dog vomited.

Dextrose and physiological saline solutions were administered intravenously and subcutaneously. A dose of 5cc of camphorated oil was administered intramuscularly, and this was repeated every hour. The patient died three hours after admission.

On necropsy a perforating ulcer, one by

There was a perforating ulcer one inch posterior to the pyloric sphincter, and catarrho-hemorragic gastritis was present

[1] Hutyra, Marek, and Manninger, 1938. *Pathology and Therapeutics of the Diseases of Domestic Animals*, Vol. II.
[2] Kirk, 1939. *Index of Diagnosis, Canine and Feline.*
[3] MacCollum. *A Textbook of Pathology*, 17th Ed.

three centimeters, was found one inch posterior to the pyloric sphincter. There was a large amount of ingesta in the peritoneal cavity. A catarrho-hemorrhagic gastritis was also present.

The dog had probably picked up some poisonous substance from garbage cans which injured the gastric and duodenal mucosa. The prolonged action of the irritant, together with the hydrochloric acid of the gastric juice, produced further damage to the underlying tissues, resulting in necrosis and finally perforation of the duodenal wall. Absorption of toxic products of the ingesta in the peritoneal cavity resulted in a toxemia affecting the central nervous system, manifested by the extreme nervous depression. The circulatory weakness may have been due to toxic injury to the myocardium, or to the circulatory center, or both.

DAVID O. MANLEY.

Wakarusa, Kans.

The Treatment of Follicular Mange

Follicular or demodetic mange, caused by the invasion of the hair follicles and sebaceous glands by the parasite *Demodex folliculorum*, is a relatively common ailment of dogs, and one which, particularly in advanced cases, is peculiarly resistant to treatment. Of the many parasiticidal agents which have been tried, preparations of rotenone have given the most encouraging results. The usual method of application is in the form of a rotenone-acetone-alcohol solution. Recently the writer has experimented with the use of an ointment consisting of rotenone and orthophenylphenol in a cholesterol base.* This was tried over a six-month period, on more than 200 animals, with gratifying results.

The clinical symptoms of follicular mange include redness of the skin, bare spots, biting and scratching, and a characteristic fetid odor. If untreated, the disease progresses by spreading gradually over the entire body surface, causing thickening of the skin, the formation of eruptive pustules, and loss of hair. In the later stages, the animal becomes emaciated and cachetic. Positive diagnosis depends upon microscopic identification of the parasite; the cases reported here were so diagnosed.

The method of treatment used in both

Demodex folliculorum (adult form)

acute and chronic cases was to rub the ointment well into the skin every 24 hours; in particularly stubborn cases, every 12 hours. Dogs with extremely long hair were clipped before treatment. Up to four ounces of the ointment was applied to the affected sites and massaged briskly until it disappeared. The dogs were confined to the hospital during the treatment period. A fairly cool temperature was maintained in the ward in which they were kept.

In acute cases, cures were effected or definite improvement shown in two to four weeks. In chronic cases (some of them of a year's standing), two or three months of treatment were required for cures, with the hair coat returning to normal in about four months. No toxic effects were observed in any case, even in those treated every 12 hours.

The efficiency of the ointment is perhaps due to its power of absorption, which apparently enables it to penetrate more deeply into the hair follicles and sebaceous glands than do the liquid preparations of rotenone.

The same ointment was used on a few cases of ringworm in dogs, with good results.

In view of the frequent misconception of the contagiousness of follicular mange, it may be of interest to add that during this trial the affected dogs were kept in the same cages with healthy dogs, and that none of the latter developed the disease. This bears out the observation of the writer and of other veterinarians that follicular mange is not transmitted by direct contact.

BURT ENGLISH.

San Antonio, Tex.

* The product used was Goodwinol, manufactured by Goodwinol Products Corp., New York City.

Book Reviews

First Aid to Dogs and Cats. *By Maurice Harvey Clarke,* M.R.C.V.S. Flexible linen binding; 145 pages, illustrated. Baillière, Tindall & Cox, London, 1941. American publisher, The Williams & Wilkins Company, Baltimore, Md. $1.00.

This handbook came into being as a result of a series of lectures given by the author to the organizers of the British A. R. P. [air raid precautions] for Animals Committee and to its Animal Service Workers. It was written for the use of these workers and of the owners of small animals. As the author states in his preface, it is in no sense a veterinary textbook, but rather a manual of instruction for lay persons telling what to do—and what not to do—in emergencies before the arrival of the veterinarian, and giving such anatomical and other information as will enable them to carry out intelligently the veterinarian's directions for treatment.

The manual achieves these purposes admirably. It is written simply and succinctly, and is so arranged as to permit quick and easy reference. Excellent line drawings of anatomical features, types of restraint, methods of bandaging, etc., add to the clarity of the discussions.

Although wartime injuries, such as gas poisoning and bullet wounds, receive the attention required by present English needs, most of the book, dealing with general accidents and other emergencies, is equally applicable in peacetime. Perhaps the only serious omission, from the point of view of American readers, is the lack of a description of rabies and the proper handling of animals suspected of being rabid. (This is not an oversight on the part of the author; because of intelligent control of the rabies problem, the disease is non-existent in the British Isles.)

A brief discussion of nutritional requirements of small animals and suggestions for wartime diets, utilizing in so far as possible foods not adapted to human consumption, are included.

It should be repeated that, unlike many popular treatises, the book in no way encourages lay treatment of diseases and injuries which require veterinary attention, but merely outlines the information essential to the most effective cooperation with the veterinarian. It may be placed without reservation in the hands of pet owners.

* * * *

The Boston Terrier. *By Vincent Perry.* 2nd edition. Cloth bound, 160 pages, 173 illustrations. Judy Publishing Company, Chicago, 1941. $2.00.

The first edition of this book, which appeared in 1928, was well received. This augurs well for the reception of this second edition, for it represents a careful revision and enlargement of the original; in fact, some of the sections have been completely rewritten, some which added little to the interest and value of the book have been omitted entirely, and much new material has been incorporated. A number of new illustrations add to the appearance of the volume, and in general the format has been greatly improved.

As in other Judy books, the first sections are devoted to the origin, history, and development of the breed, the official standard and its interpretation, and show conditioning and handling. The latter sections (comprising about one-half the book), written by Captain Judy, review the principles of breeding, feeding, training, showing, selling, etc., applicable to any breed. These contain the same practical information presented in other books of the Judy series.

A comparison of the chapters on canine diseases in the first and in the present edition reflects credit on the Judy policy of improving such chapters by increasingly placing the handling of animal disease where it belongs—in the hands of veterinarians. Even the earlier edition advised consulting a veterinarian about all dog ailments; but it was marred by the addition of such gratuitous advice as: "A handful of dry tablesalt forced down a dog's throat will rid him of a great deal of the poison in his system [in distemper] and sometimes effect a quick recovery if done soon enough." All such unfortunate suggestions have long since been deleted from Judy books, and the chapter as it stands should on the whole meet with veterinary approval. One sen-

tence that offends (we have mentioned it before in reviews of Judy books) is: "Rabies is so rare that it can be considered the rare exception." Captain Judy is better informed than that and one must assume the statement is included as a sop to the fanatic antis.

* * * *

The New Army of the United States is a paper-bound mimeographed publication issued by the War Department. Its 141 pages contain a report of the different phases of the growth of the army from July 1, 1939, to July 1, 1941, together with a description of its organization and the missions, methods and equipment of its various components as of August 1, 1941. This well-prepared report gives a comprehensive view of the many ramifications of the new Army. The account of any one branch is necessarily brief. It is noted that it is anticipated 50,000 horses and mules will be used by the Army, and that the services of veterinary officers are required "for these, for the Army remount service, and for the inspection of meat and dairy products intended for Army consumption." Revised editions are contemplated as they become necessary.

* * * *

Meat for Millions, the 283-page report of the New York State Trichinosis Commission, covers fully all aspects of the trichinosis problem. A wealth of data is contained in 49 tables, 16 figures, and five charts; much of it placing the chief blame for the perpetuation of *Trichinella spiralis* where it belongs, squarely upon the practice of feeding uncooked garbage to swine. Copies of the meat inspection laws of various states and the proposed revision of the New York State meat inspection law, as well as information concerning municipal ordinances, are included. Recommendations for trichinosis control are presented. Veterinary authorities are freely quoted. This report should be in the hands of all who are interested in the trichinosis situation in the United States — a category which should include all veterinarians. Copies of the report may be obtained, without charge, from State Senator Thomas C. Desmond, Chairman of the New York State Trichinosis Commission, 94 Broadway, Newburgh, N. Y.

You may obtain any book reviewed in this department by remitting the published price to the Book Department of VETERINARY MEDICINE, 7632 S. Crandon Ave., Chicago, Ill.

Vitamins and Hormones. *By Victor Lewitus,* Ph.G., B.S., M.A., formerly Instructor in Materia Medica, Columbia University College of Pharmacy, and Professor of Toxicology, First Institute of Podiatry. Cloth bound; 80 pages, illustrated. Veterinary Magazine Corporation, Chicago, 1941. $1.00.

Prof. Lewitus' latest series of articles, published in VETERINARY MEDICINE during 1940 and 1941, has been reprinted in book form for those who desire to have these authoritative articles permanently available for reference.

The purpose of this compilation is to present in condensed form to the veterinary practitioner the enormous volume of data in the two newest fields of materia medica, the vitamins and the hormones. Historical and chemical considerations are summarized briefly, but the chief emphasis is placed upon the practical clinical application of research findings. Wherever possible, definite descriptions of the pathological conditions involving each vitamin or hormone are given, as well as the latest recommendations with respect to dosages and methods of administration. Where the practical application has not yet been fully worked out, generalizations are made which point the way to the possibilities of future uses of the vitamin or hormone under discussion.

There are few works available which cover the field of veterinary application of this new aspect of materia medica, and none which does so in such succinct yet complete fashion. This little book will prove a valuable addition to the practitioner's library.

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You'll Be Interested to Know That . . .

A timely caution against too hasty conclusions in the field of vitamin deficiencies is expressed by a contributor to the *Journal of the American Medical Association*, who refers scathingly to the "Give-a-dose, if-the-patient-feels-better-he-has-a-deficiency" school of research workers.

■

Some 40 dogs which served with the U. S. Antarctic Expedition in 1939-40 have been drafted for army service as sled dogs and are scheduled to aid American defense in the North this winter. After a training period in New Hampshire, they will be sent to Newfoundland sometime in November, according to the War Department. . . . The comparatively mild Newfoundland winter should be easy for these veterans after the blizzards of the South Polar regions.

■

We were a little startled to observe in the last issue of the *Vitamineral News* a quotation from an article by Dr. S. L. Stewart which appeared in VETERINARY MEDICINE in July, 1930. Our first gloomy impression was that the Vitamineral people consistently read their copies of the magazine eleven years later; but this impression was dispelled when we noted other items culled from current issues of our journal. . . . The final upshot of our reflections on the matter was that the incident bears out the observation that most of the material published in VETERINARY MEDICINE is of permanent rather than of transient value.

■

The item about the tailless colt published last month reminded Dr. J. R. Fisher, Saskatoon, Sask., of the twin tailless calves he en-

countered a number of years ago while practicing at Brandon, Manitoba. One was a heifer and one a bull calf. The animals, purebred shorthorns, grew to maturity, at which time he photographed them. Later both were slaughtered.

A Message to Practitioners

Practicing veterinarians throughout the United States, and particularly those living in the Mississippi Valley, will be interested to learn that the American Society of Veterinary Therapy (The Practitioners' Association) is planning a national meeting at an early date. Much time and study is being given to this, their first program. It will be arranged by men familiar with the subjects of special interest to the veterinarian engaged in practice. The officers mean to make this program an outstanding one, differing in many aspects from past programs of other veterinary associations. This meeting will take place when there has been time to arrange every detail and to secure the best talent available on subjects of interest to the group. The date will coincide with the slack period in practice and be so timed as to interfere little with other meetings.

J. C. Flynn, Sec'y The Practitioners' Association

All practitioners are welcome to attend this meeting. A centrally located city, where the best facilities are available, will be selected. The date and further details of the program will be announced in veterinary publications.

Your suggestions are solicited as to subjects and clinical cases and also as to the time of meeting. For further information address Dr. J. C. Flynn, Secretary, 3026 Main Street, Kansas City, Mo.

■

The recently-organized Bloodhound Club of America plans to hold its first annual meeting in Chicago during the latter part of March, 1942, at the time of the International Kennel Club show, and to have its first annual specialty show there. Capt. Will Judy is president of the organization.

■

The toxicity of phenothiazine for horses is still a moot point. . . . In the trials reported by Robinson and Kays (pages 557-559), no toxic effects were observed. Dr. B. E. Carlisle, of Camilla, Ga., writes that he has administered phenothiazine in large doses to not less than 150 horses and mules, and has encountered no ill effects. . . . Because of occasional reports of toxicity and sometimes death following administration of the drug, however, the wisest course at present seems to be to give it with caution, particularly to animals showing symptoms of anemia; and to discourage its promiscuous use by laymen.

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WORLD MAP OF DOGS—Unique, Educational; 19" x 24"; $1.00 each (3 for $2). Also Chart of All American Breeds, same size, same price. Only complete American work on dogs, **Judy's Dog Encyclopedia**, $5. Judy Publishing Co., 3323 Michigan Blvd., Chicago, Ill.

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"HORSESHOES OF INTEREST TO VETERINARIANS" by the late Prof. Henry Asmus, Cornell University. This new book on horseshoeing contains 164 illustrations of shoes for both healthy and defective hoofs and for several kinds of lameness, with full description of each. Useful to the general practitioner as well as to the specialist on lameness in the horse. Price $1.00. Address Mrs. Henry Asmus, 7 Reservoir Ave., Ithaca, N. Y.

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■

Last month we mentioned the use of red-lensed spectacles to prevent cannibalism in hens. . . . Another widely-different use for red glasses is by anti-aircraft gunners, who are thus enabled to see more clearly the flaming course of tracer shells. . . . This observation is referred to the antivivisectionists, as one of the many instances in which man is kinder to animals than to himself in applying scientific findings.

■

The Greater South Dakota Association recently pointed out that aside from state and federal veterinarians, who are not available to farmers in the state for general practice, there are no graduate licensed veterinarians residing in 28 South Dakota counties, to wit: Aurora, Bennett, Brule, Buffalo, Campbell, Clark, Custer, Dewey, Fall River, Faulk, Haakon, Hamlin, Harding, Jackson, Jerauld, Jones, Lawrence, Lyman, McPherson, Marshall, Meade, Mellette, Perkins, Roberts, Sanborn, Stanley, Sully, and Ziebach. . . . The G. S. D. A. estimates the value of live stock in these counties to be nearly $50,000,000.

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Many subjects of interest to practitioners are scheduled for discussion at the next meeting of the Kansas Veterinary Medical Association (Wichita, Kans., January 5-6, 1942). Among them are nutritional diseases in animals, the role of the veterinarian in post-war rehabilitation, and public health matters of interest to the veterinary profession. A veterinary round table will be held, at which members will have a chance to get practical information concerning their problems.

C. W. Bower, Sec'y Kansas V. M. A.

The Kansas group, largely practitioners, is an active one. In cooperation with the state Board of Health, it utilizes the services of an attorney who polices the state, checking on illegal practice of veterinary medicine. The association has a page edited by the secretary in the *Kansas Stockman,* in which appear articles of considerable educational and public relations value. Each year the complete proceedings of the annual meeting are published in book form.

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Coming Meetings

Maine Veterinary Medical Association, quarterly meeting, DeWitt Hotel, Lewiston, Me., October 22. (Originally scheduled for October 8; postponed because of conflict with date of New England Veterinary Association meeting.)

Pennsylvania State Veterinary Medical Association, 59th annual meeting, Harrisburg, Pa., October 23-24.

Southern Veterinary Medical Association and Florida Veterinary Medical Association (joint meeting), George Washington Hotel, Jacksonville, Fla., October 27-29.

Connecticut Veterinary Medical Association, quarterly meeting, University of Connecticut, Storrs, Conn., November 5.

Midwest Small Animal Association, 4th annual clinic, Hotel Burlington, Burlington, Ia., November 6.

Mississippi Valley Veterinary Medical Association, Hotel Custer, Galesburg, Ill., November 13-14.

United States Live Stock Sanitary Association, 45th annual meeting, La Salle Hotel, Chicago, Ill., December 3-5.

American Association for the Advancement of Science, Dallas, Tex., December 29-January 3.

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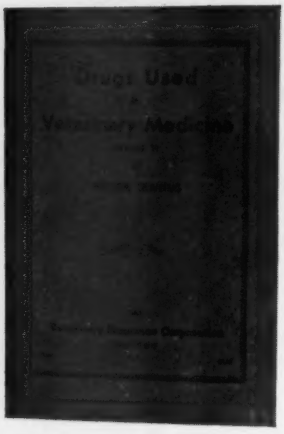

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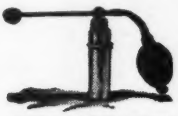

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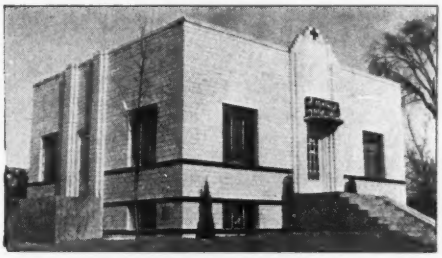

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■

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■

Dr. James A. McKitterick, Lee's Summit, Mo., started a hatchery in 1939 in order to produce chick embryos for equine encephalomyelitis vaccine. The hatchery is now a profitable sideline to his private practice . . . A shipment of baby chicks sent by him air mail to San Jose, Costa Rica, at 11:50 p.m. July 23rd arrived intact at its destination at noon July 25th, the chicks all alive and in good condition.

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During 1940 Iowa State College's two veterinary clinics (hospital and ambulatory) cared for a total of 17,364 animals. Hogs led the list of patients with a total of 6,195. Dogs were next with 4,621, and cattle took third place with 4,143. Horses (1,023), sheep (836), and cats (233) were also frequent patients. The 102 miscellaneous animals treated included chickens, canaries, rabbits, monkeys, skunks, and groundhogs.

■

Deaths of Veterinarians

Thomas W. Scott, 77, St. Paul, Minn., Ontario Veterinary College, B. A. I. service 1900-1934, May 1,

Clifton Carter, 61, Burwell, Nebr., Kansas City Veterinary College '08; B. A. I. employee 1905-1941, serving in Kansas City, Texas, Colorado, Nevada, and latterly in New Mexico, retiring April 1, 1941; May 20.

Ernest F. Erfurth, West Fargo, N. D., Kansas City Veterinary College '09; B. A. I. service 1913 until his death July 23, stationed at Kansas City, Kans., San Francisco, Calif., and West Fargo.

E. E. Deeds, Osceola, Nebr., July 30.

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Swine Erysipelas
Diseases of the Joints of Swine
Infectious Necrotic Enteritis
Major Acute Infections in Swine
Nematodes and Nematodiasis in Swine
Ecto-Parasites and Mange Mites
Hairless Pigs: Goiter
Nutritional Diseases of Swine
Scour of Pigs
Hemorrhagic Septicemia (Swine Plague)
Rickets in Swine
Rhinitis of Pigs (Bull Nose)
Agglutination Test in Erysipelas
Sterility in Swine
Protozoal Diseases of Swine
Swine Pox (Variola Suilla)
Stomatitis of Pigs
Swine Flu
Anemia of Suckling Pigs
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Sterling M. Reagan, 74, Hillsboro, Ore., Kansas City Veterinary College '04, retired in 1929, August 1.

Kenneth Edgar Brown, 27, Vancouver, B. C., Ontario Veterinary College '38, on Health of Animals Division staff, August 7.

Willard Ellis Corry, 31, Little Rock, Ark., Texas A. & M. College '39, secretary of the Arkansas Veterinary Medical Association, August 10.

A. H. Moody, 88, Three Rivers, Mich., Ontario Veterinary College '85, practiced in Three Rivers 55 years, August 11.

J. C. McNeil, 60, Onaway, Mich., Ontario Veterinary College, '06, August 13.

Alonzo S. Nesbitt, 74, Decatur, Ill., Chicago Veterinary College '94, practiced at Maroa, Ill., until retiring a few years ago, August 13.

Henry C. Petersen, 54, Marquette, Nebr., Kansas City Veterinary College '16, World War veteran, August 14.

Arthur F. Brown, 58, Eau Claire, Wis., Grand Rapids Veterinary College '07, practiced in Oregon for a few years before coming to Eau Claire, August 15.

Malcolm James Rattray, 54, Vidalia, Ga., Alabama Polytechnic Institute '12, practiced in Vidalia nearly 30 years, August 16.

Asa Ellsworth Hoffman, 63, Detroit Lakes, Minn., Kansas City Veterinary College '06, first president of the Lake Region Veterinary Medical Association and city dairy inspector for several years, August 17.

George C. Mawer, 69, Cleveland, O., Ohio State University '92, practiced at Oak Harbor, O., until 1906, when he entered B. A. I. service, from which he retired in 1940, August 18.

W. R. Phillips, Montezuma, Ia., August 24.

Abram N. Reber, 77, Welborn, Kans., in B. A. I. service at Kansas City, Kans., retiring 11 years ago, September 1.

Walter E. Campbell, 47, Bel Air, Md., University of Pennsylvania '16, World War veteran, former president of Maryland State V. M. A., September 2.

Alexander M. Henderson, 56, Aurora, Ill., Chicago Veterinary College '10, practiced at Aurora 25 years, since 1935 proprietor of Deerpath camp at Land O'Lakes, Wis., September 4.

W. R. Morgan, Williamsburg, Ky., practiced at Lebanon, Ky., for 16 years before removing to Williamsburg a few months ago, September 8.

James Clark Mitten, 45, Puyallup, Wash., Terre Haute Veterinary College '16, September 18.

William Watson Bennett, 71, East Hampton, L. I., New York, formerly staff veterinarian for Barnum & Baily's Circus, September 24.

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